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Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine, and The Telephone

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY, MONADNOCK BLOCK, CHICAGO

VOL. XVI. No. 20

CHICAGO, DECEMBER 26, 1908

10 CENTS PER COPY
$2 PER YEAR TO U. S. AND MEXICO
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1889 Paris Exposition Medal for Rubber Insulation — 1893 World's Fair Medal for Rubber Insulation

OKONITE
TRADE MARK
REG. U.S. PAT. OFFICE

The Standard for Rubber Insulation

OKONITE WIRES, OKONITE TAPE, MANSON TAPE, CANDEE PAT'D POTHEADS

THE OKONITE CO., Ltd. Sole Manufacturers 253 Broadway, New York

WILLARD L. CANDEE, H. DURANT CHEEVER, MANAGERS — W. H. HODGINS, SECRETARY — GEO. S. MANSON, SUPERINTENDENT — W. C. CANDEE, ASS'T SECRETARY

OKONITE
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CONDUIT

P C C

CLAY PRODUCT COMPANY

Stock Exchange Bldg. CHICAGO

LOOK FOR THE TAG
ON EVERY COIL OF

MONARCH

Special Brand Weatherproof Copper and Iron Wire and Cables. Scientifically made. Stands the most rigid inspection. Ask the user about it. If your jobber cannot furnish it take no substitute but

WRITE TO US

MONARCH ELECTRIC & WIRE CO.

MAKERS OF THE WIRE WITH THE TAG

CHICAGO

McROY CONDUITS

CHICAGO
ROOKERY BUILDING

KERITE

Insulated Wires and Cables

1850 DAYS KERITE 1908

The Insulation which has withstood successfully the test of half a century

W. R. BRIXEY, Sole Manufacturer

HUDSON TERMINAL

30 Church Street, NEW YORK

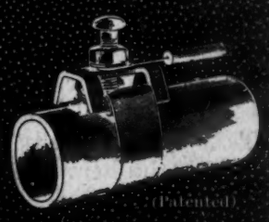
CHICAGO TELEPHONES SATISFY

CHICAGO TELEPHONE SUPPLY CO.

FACTORY AND GENERAL OFFICES

ELKHART, IND. U.S.A.

NEW YORK GROUND CLAMP



(Patented)

For connecting telephone ground wires to pipes or cables without the use of solder.

Adapted to any size of iron or lead pipe.

Makes a firm and permanent electrical connection.

Used by Independent Telephone Companies everywhere.

Approved by National Board of Underwriters.

YONKERS SPECIALTY CO.
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"DETROIT" RUBBER COVERED WIRES

Telephone Pair a Specialty

DETROIT INSULATED WIRE CO.
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Wire, Sheet, Rivets and Contacts

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BAKER & CO., Inc., Newark, N.J.
N. Y. Office: 30 Church Street

TELEPHONE CABLE

WATERBURY CO., 69 SOUTH STREET, NEW YORK CITY

ALPHABETICAL INDEX TO ADVERTISEMENTS ON PAGE 44

1908-Lease Records-1909

Send for our "Newform." The best companies all use it, and re-order year after year.

Our **Improved Cash Book** is just out and going fast. The most valuable form yet devised for keeping detailed Telephone Accounts simply and accurately. Used and approved by best Telephone Accountants.

Our Books, Blanks and Forms for Telephone and Toll Line Accounting are "Standard" and used more than any other. Write for sample forms and prices.

THE TELEPHONE PRINTING COMPANY
DEFIANCE, OHIO

The Indiana Rubber & Insulated Wire Co.

PARANITE TRADE MARK

MANUFACTURERS OF

Insulated Wires and Cables

JONESBORO, IND.

Just what you need at Central. Cut down cost—improve light.

Operators Managers Telephone Men

It's easy money, $5.00 to $15.00 extra every evening. Everybody wants it in the country. Reduces gas bills in the city. **One-twentieth the cost of Electric light.**

JUST THINK OF IT

The Ideal Incandescent Kerosene Burner **gives 100 candle power gas light from common kerosene.** It fits any old lamp. One pint of oil lasts 8 hours. Safest and most reliable light on earth. No odor, no noise. **Guaranteed satisfactory.** Order one, $2.35. Show it up. Take orders. Sells for $4.50—worth $50.00. Now is the harvest time. Write for agency.

ACORN BRASS MFG. CO.

53 North Peoria Street :: :: CHICAGO, ILL.

HUBBARD & CO.

PITTSBURG, PA.

Manufacturers of

Pole Line Hardware

Cross Arm Braces, Pole Steps, Ground and Anchor Rods, Bolts, Washers, Pole Seats

ALL GALVANIZING BY THE

HOT DIPPED PROCESS

Guaranteed to stand the American Telephone and Telegraph Company's Four Immersion Test

CHICAGO OFFICE: 417 FISHER BLDG.

TOLL TICKETS

No order too small, no order too large. Last month's orders about 7,000,000 each week. We beat them all in prices. Better ask for quotation.

MIRROR PRINTING COMPANY

THE HOUSE OF THE STANDARD TOLL TICKET

ALBION, MICH. 109-111-113 CENTER STREET

DIRECTORIES And All Blanks

SPECIAL CASH DISCOUNTS

The Wire of Quality

TELEPHONE WIRE

Best by Every Test

A Difference in Wire makes a Difference in Service.

LONGEST LIFE—HIGHEST EFFICIENCY

Universities have tested our wire and found it of the highest quality. Leading Telephone Companies use it, with perfect satisfaction in most exacting service.

Write for Samples and Prices Today

Handled by Representative Jobbers and Supply Houses

INDIANA STEEL & WIRE COMPANY

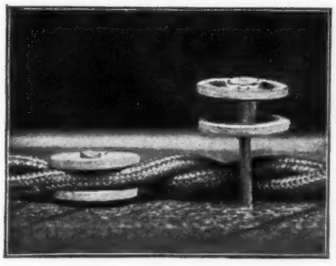
MUNCIE, INDIANA

Eureka Fibre Insulators

A NEW STYLE

"PRICES TO POINT, WHERE IT IS ECONOMY TO USE THEM"

The value is in the method that they are attached without injury to the wire.

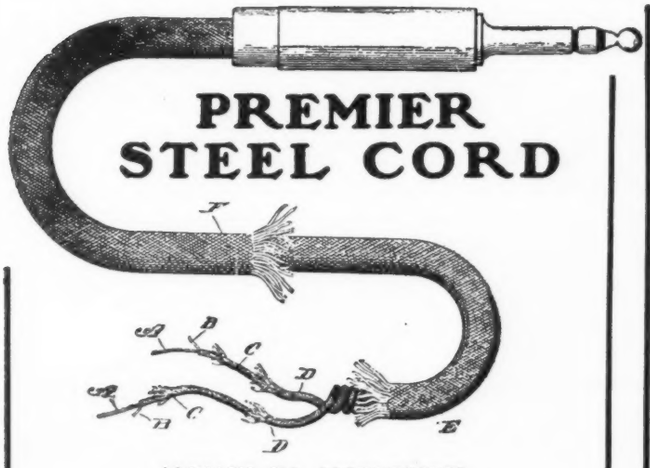


Made in Three Types
50, 60, 70
¾", ⅞", and 1" long respectively.

PRICES AND SAMPLES ON APPLICATION

COMMERCIAL ELECTRICAL SUPPLY CO.

Fifteenth and Pine Streets ST. LOUIS, MO.



PREMIER STEEL CORD

ALWAYS IN ALIGNMENT

In the hollow of the cord at the plug end, there's a reinforcing spring made of the highest grade spring steel. Not only does this prevent the conductors from being thrown out of alignment, but it also makes it practically impossible to break the cord at the plug end, and that's where the strain is greatest. Operators don't have to be careful when you use Premier Steel Cord—it'll last in spite of shamefully careless usage. Better get details.

Runzel-Lenz Electric Mfg. Co.
97-101 South Clinton Street, Chicago

Five Men on a 95 cent PEIRCE SEAT

We make six designs of seats, three all steel and three with wood seats.

Get circulars.

Peirce Specialty Co.
ELKHART, IND.

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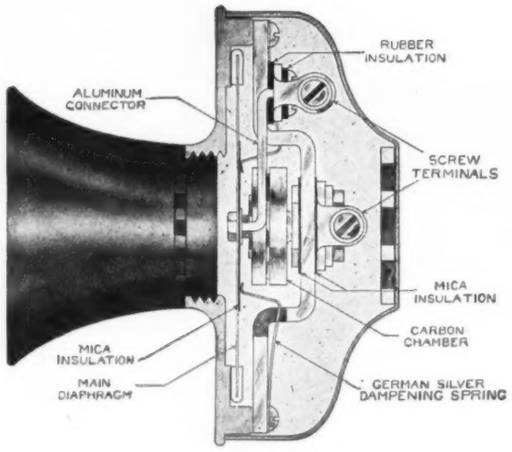
Cracraft, Leich Transmitters

ARE GIVING UNIVERSAL SATISFACTION



Not one single complaint has been received by us from the users of the many thousands of Cracraft, Leich transmitters now in actual service, but on the contrary, we have a great many letters in our files telling us about the satisfactory service they give.

We are proud of this record, and will gladly send a sample transmitter for general inspection and test to reliable parties.

Write for Advance Bulletin of Magnet telephones.

Cracraft, Leich Electric Co. **Genoa, Ill.**

Insulated Staples

5 Sizes

Pat. Nov. 1900

BLAKE

TUBE FLUX for SOLDERING

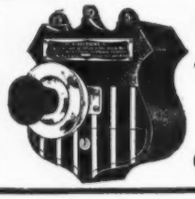
Full Size of Tube, 1" x 5"

Patented Feb. 4, '08

COMPRESSED CLEATS FOR USE ON PLASTERING

EXACT SIZE PAT. JULY 1906

BLAKE SIGNAL & MFG. CO. WRITE FOR SAMPLES 246 SUMMER ST., BOSTON, MASS.

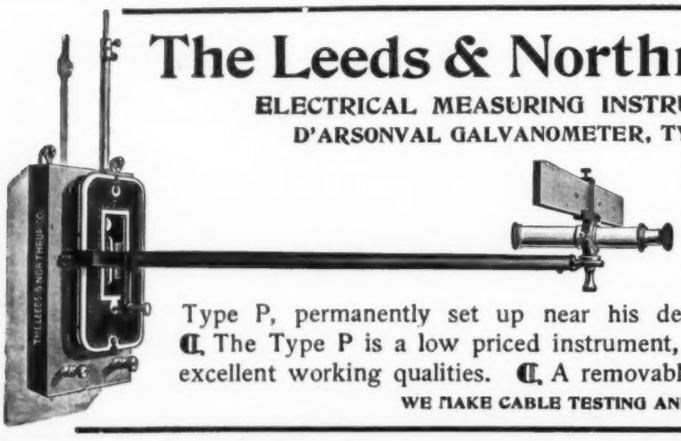


DO YOU WANT WHAT'S DUE YOU?

THEN INSTALL **GRAY PAY STATIONS** AND YOU'LL GET IT

All details are in Catalog No. 50. Write for a copy.

GRAY TELEPHONE PAY STATION CO., Hartford, Conn.



The Leeds & Northrup Co.,

4901 Stenton Avenue
PHILADELPHIA
Monadnock Block
CHICAGO

ELECTRICAL MEASURING INSTRUMENTS
D'ARSONVAL GALVANOMETER, TYPE P

¶ Your wire chief has use for a reflecting type D'Arsonval Galvanometer. His cable testing set will have a greater range if he can make insulation and capacity measurements with a reflecting galvanometer. With our Type P, permanently set up near his desk, he can make routine tests of insulation. ¶ The Type P is a low priced instrument, well made, of pleasing appearance, and has excellent working qualities. ¶ A removable damper converts it for ballistic measurements.

WE MAKE CABLE TESTING AND FAULT LOCATING APPARATUS

Please tell the Advertiser you saw his Announcement in TELEPHONY.

K-E-R-I-T-E

Highest Award World's Fair, 1893

TELEPHONE 1860 1908

Highest Award World's Fair, 1893

Insulated Wires and Cables

¶ The rigid test and continuous service of over 40 years has demonstrated that KERITE does not deteriorate but improves with age, and is Unequalled for Life, Service and Durability

FOR ALL PURPOSES

Interior, Bridling, Distributing, Etc.
Aerial, Underground, Submarine

¶ Rubber covered telephone wire output 2,500,000 feet per week.

Use KERITE for Service and for Economy

Kerite Insulated Wire & Cable Co.

(Incorporated by W. R. Brixey) Hudson Terminal, No. 30 Church St., New York City

Western Representative: Watson Insulated Wire Co., Railway Exchange Bldg., Chicago

THE ROBERTS SYSTEM

Will increase your net revenue

50%

Without increasing cost of maintenance
We are doing it for others
Why not let us do it for you?
Are you interested? Write for particulars

Homer Roberts Telephone Co.

1703 Melrose Street, Chicago, Illinois

THE NEW
DeVeau ALL METAL Telephones
"HAVE NO EQUAL"
"QUALITY"

Furnished with condensor and high wound ringer for common battery work. Any special finish desired.

Cat. No. 1173

Cat. No. 1172

All metal. Black rubber finish mounted with nickle trimmings. Removable switch hook. Clip cover easily removed. Knockout holes on each end for cable.

Send for our descriptive pamphlets

Cat. No. 126

DeVeau Telephone Mfg. Co.
471 18th Street Brooklyn, N. Y.

If You Consider
THE POOLE
Lock-Out System

as an addition to party-line service, you are wrong. It is not something added—it is a feature which has always belonged to good service. It unfailingly gives absolute

SECRECY

to any of the parties on the line. It gives the subscriber all the advantages of a private line at the cost of a party line. It enables you to put more parties on a line, and get higher rates.
Now, do you want details?

Mountain State Electrical Co.,
Wheeling, W. Va.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

200 Line Unit Type Magneto Switchboard

EQUIPPED WITH

No. 152 Keys—Combination Clearing Out Signal and Ringing—Listening Key

No. 8 Self-Restoring Gravity Drops

¶By exercising careful thought and engineering ingenuity we have succeeded in arranging our well-known magneto switchboard cabinet for **200 Drop Line** equipments. Mounting **No. 8 Drops** ten (10) per strip in ten (10) rows each on two (2) panels and combining a clearing out signal with the keys in the shelf of the cabinet, every available inch of space in the face of the board is utilized.

¶Besides providing the greatest accessibility of all parts and the greatest ultimate capacity in the least cabinet space, we maintain proportions in cabinet construction that afford absolute control of every line by one operator from a sitting position in front of the board.

No. 5 A—Operator's Transmitter Arm—An adjustable extension arm made of seamlass brass tubing—highly nickel-plated and constructed rigidly — equipped with two **No. 10—5-foot Transmitter Cords** and **No. 1 Cord Weigths.**

No. 39 Escutcheons—When the equipment ordered partially equips the switchboard panel the unequipped space is filled in with blank metal escutcheons as illustrated. These are instantly removable.

No. 8 Self-Restoring Gravity Drop—The ingenious feature of all our Magneto Switchboards. A gravity drop that consists of few well-designed parts—positive action, and is sensitive and reliable. **Ask for further particulars and Pamphlet No. 6.**

No. 36—Plug and No. 78—6-ft. Cord—The rear plug of the cord pair is known as the answering plug. No. 2 Cord Weights are furnished with each cord. The cords in these switchboards never give trouble and will outwear all other makes.

No. 58—Operator's Jack—This part of our operator's equipment is a carefully insulated piece of apparatus. The complete equipment consists of this jack, a No. 15A Receiver and No. 87—6-ft. Cord with No. 40 Plug attached.

No. A5554—Switchboard Cabinet—All our switchboard cabinets are made in our own factory. The general dimensions of this cabinet afford an operator easy access for a greater number of jacks or subscribers' lines than any other board of the same capacity. Write for further particulars.

No. A-5554—200-Line Switchboard Cabinet

No. 28 Key—The key located on the top panel in the right-hand side is the Generator Switch. The **No. 21 Key** located in the left-hand side is the Night Bell Switch.

No. 8 B—Operator's Transmitter—Identically the same interior construction as our No. 7 Transmitter. A leading product producing the maximum volume of voice transmission with excellent articulation. Does not pack—absolutely moisture proof.

No. 36—Plug and No. 78—6-ft. Cord—The front plug of the cord pair is known as the calling plug. We have been making plugs for a good many years and know how to make a plug that does not become disassembled in operation.

No. 1—Plug Hole Stops—The keyshelf is drilled for an ultimate of eighteen pairs of cords. All unequipped pairs are provided with these removable bushings made of hard rubber.

No. 57—Generator—The high voltage output of our generators and their greater permeability make them the preferred article for dependable ringing service. A special crank handle and shaft is provided with this generator.

No. 152 Key—A combination Clearing-Out Drop with Ringing and Listening Key. The Drop Shutter is automatically restored for the next call upon actuating the Listening Key in response to the previous call. With the entire supervising equipment located in the keyboard and by eliminating the operation of restoring clearing-out drops manually, we have provided an economical and useful device.

No. 9—Foot Rail Bracket—Furnished with this type of cabinet, including 1¾-in. seamless polished brass rail. This additional feature for a Magneto Switchboard will be found convenient and particularly characteristic of the best designed Magneto Switchboard.

If you cannot order today, at least send for Prices. Pamphlet No. 8 upon application.

See our Exhibit

4th Annual Electrical Show, Coliseum, Chicago, January 16-30, 1909

Special Grand Telephone Meeting, January 26 and 27, 1909

STROMBERG-CARLSON TEL. MFG. CO.

ROCHESTER, NEW YORK, U.S.A.

CHICAGO, ILL. KANSAS CITY, MO.

New Bulletin No. 26 Just Out

Showing Our "PRIMO" SWITCHBOARDS

MAILED FREE
Write To-day

Central Telephone and Electric Co.

St. Louis—Dallas

Makers of High Grade Telephone Apparatus

NEW—AND—GOOD
Crown Metal Telephone

Guaranteed Perfect Mechanically and Electrically

Attractive in Design and Finish

Made of Pressed Steel (or Brass) and Finished in Nickel, Copper Oxidize or Japan.

Useful for Connection Between

Your office and wareroom.
Your neighbor's house and your own.
Your house and your stable.
Your kitchen and servant's room—
or any other two points.

SPECIAL CLAIMS

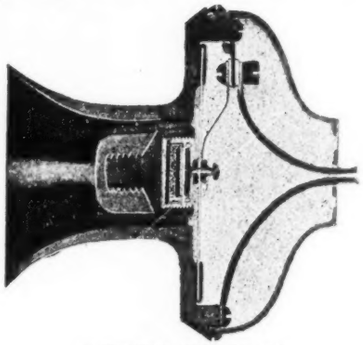
1st—Being of metal, these telephones will not shrink in dry places or swell in damp places.
2nd—They are as near perfection as human ingenuity can make things.
3rd—They are the cheapest high grade telephones ever offered on the market.

If interested in any other Interior Telephone Apparatus, write us for information. We believe that our facilities, workmanship, materials, prices and products can not be duplicated.

DEALERS WRITE FOR DISCOUNTS

The Standard Mfg. Co.
BRIDGEPORT, CONN.

THE BEST BY EVERY TEST



PATENTED NOV. 26, 1907

Our transmitter is durable, simple in construction and is the **BEST Talker on the Market.**

Current Consumption Just one-half that of the next best. Packing Impossible.

Send for our Descriptive Matter

Interstate Elec. Mfg. Co.
SIOUX CITY, IOWA

Please tell the Advertiser you saw his Announcement in TELEPHONY.

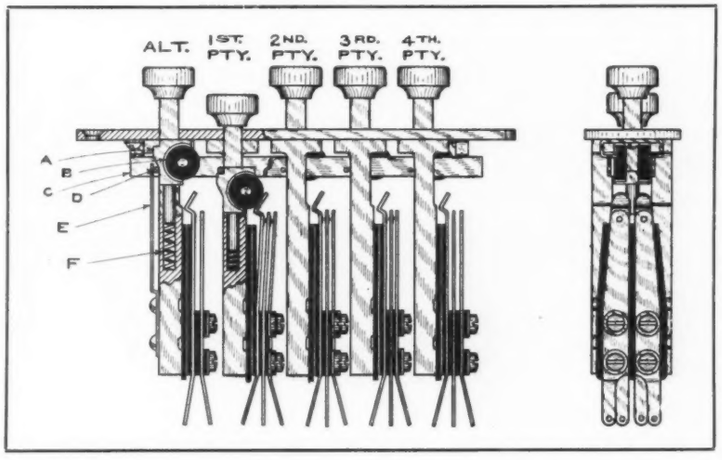
The Monarch Master Key

is shown here in detail

How does it compare with the others that you know?

The letter A indicates the shoulder which is engaged by the pin D when a button is depressed, as shown with the button marked First Party.

The carriage C, which carries the pins when forced to the left is brought back to a normal position by the flat spring E.



The hard rubber rollers, indicated by B, act as bearing points against the contact springs and prevent the buttons from sticking.

F is a spiral spring which restores the button to the normal position when it is released.

¶ Each group of contact springs is mounted on a separate frame and any of these frames with its group of springs can be removed without disturbing the others or interfering with their operation.

¶ This key is used in our Direct Current Selective System and as the pressing of one button automatically releases any of the others it is impossible to have both alternating and direct current on the line at the same time.

¶ The ringer used in our Direct Current System is constructed as well as the key and operates on the simple and reliable principle of a vibrating bell

¶ Besides the key and the ringer all that is required to install our Direct Current System is a battery of dry cells and two resistance coils. No pole changer is used.

¶ Write for our Bulletin No. 6 describing this remarkably simple selective system.

Monarch Telephone Manufacturing Co.

Washington and Morgan Streets :: CHICAGO

177 Main Street :: :: DALLAS, TEXAS

Please tell the Advertiser you saw his Announcement in TELEPHONY.

American Protector Strips

Wood and Steel Bases

Section of No. 900

Section of No. 992

The AMERICAN No. 900 Protector Panel is a protector strip of tubular fuses and carbon lightning arresters, mounted on hard maple base boiled in oil. It is designed either for an office terminal and protector strip, or to be mounted in cable boxes. It is furnished with an angle iron heel plate for mounting. The fuse connections are the "American Hook Type," with German Silver re-enforcing springs. The tubular fuses furnished are of fibre or wood. Panels are made in any size, or number of lines desired.

The No. 992 AMERICAN Protector is specially designed for protection against high tension electric currents, the panel being specially spaced for this work. The base is of oxidized steel, with the best grade of hard rubber and fibre insulation. The mountings are extra heavy and the fuse connections are of the "American Hook Type." The fuses are either of wood or fibre. Standard sizes are five pair or any multiple thereof.

A similar design, made up on a little smaller scale, is Type BB, the price of which is about 25 per cent less than No. 992.

Prices are low **Quality is High** **Send for Samples**

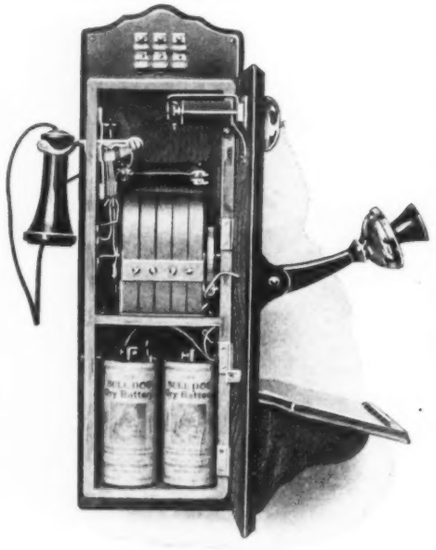
Muskegon, Mich. **American Electric Fuse Co.** New York, N. Y.

300 Workmen in Our Factory, "Minding" Our Own Business.

Our "Jolly Good Fellow"

Continues to be in great demand

M E R I T



P O P U L A R I T Y

Open View No. 50

Answer:—STANDARD instruments are made from the best of raw material by the most expert workmen obtainable according to the designs of highly competent engineers. Are you getting satisfaction? The best Magneto telephone is spelled STANDARD.

The Standard Telephone Mfg. Co.

Portsmouth, Ohio

Successors to The Williams Telephone & Supply Co., Cleveland, Ohio.

RELIEF FROM RUBBERNECKS

Andrae "Ring Three" Condensers enable you to ring right by the station that has its receiver off the hook "listening in."

The principal trouble on party lines is the ringing. Sometimes a call goes through, sometimes part of it goes through, and sometimes it does not go through at all.

Many rural subscribers cannot resist the temptation to "listen in." This listening puts a low resistance across the line and picks up the current that should go to the ringer and subscribers and operators wonder why calls are not answered and bells do not ring. Put an Andrae "Ring Three" Condenser on each telephone and bells will ring in spite of the rubbernecks. Ten minutes time and a screwdriver will do the work.

Write for our free trial offer.

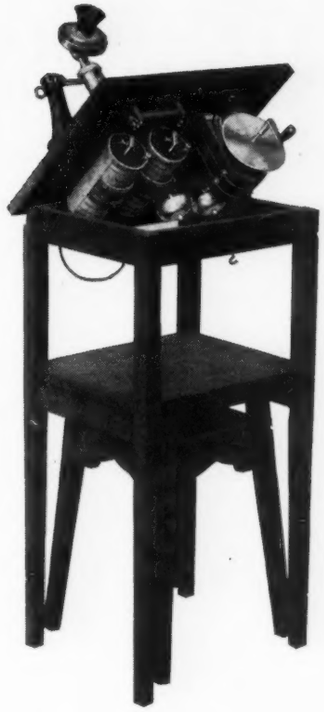
Julius Andrae & Sons Co.

217 W. Water Street

MILWAUKEE

Please tell the Advertiser you saw his Announcement in TELEPHONY.

What you have always wanted



Easier and quicker to install than a wall instrument and will cut down the usual heavy maintenance expense of the ordinary desk telephone

MANY people prefer desk telephones, but have no convenient place for them. This outfit provides for such cases. In many instances a higher rate of rental can be charged, or some particular subscriber can be pleased with this handsome and convenient outfit.

A telephone stand equipped with a complete desk telephone outfit, consisting of the telephone itself, fastened permanently to stand or not—optional; generator, bells, batteries, lightning arrester, line terminals, and all completely wired ready for service. Not as much trouble to install as a wall telephone.

The telephone equipment is, of course, the best in the world, the SWEDISH-AMERICAN. The stand is of the regulation height and most convenient size, Mission or Golden Oak finish; a piece of furniture that will ornament ANY HOME OR OFFICE. The style, finish, material and workmanship are strictly first-class in every respect. The stool shown in cut matches the stand and when not in use can be shoved under the stand, out of the way, as shown in illustration at the right. Top of stand is hinged so as to make every part of telephone easy of access.

This combination would answer admirably for a booth set; pay station slot machine can be mounted on top of stand and in contact with telephone, thus insuring the operator of receiving the signals.

We furnish this outfit for any Magneto or Central Energy system and guarantee entire satisfaction.

Price, complete	**—Central Energy (any system)**	**$14.00**
" "	**—Magneto, Series instrument**	**13.00**
" "	**—4 bar, 1000 ohm Bridging**	**14.50**
" "	**—4 " 1600 " "**	**15.00**
" "	**—5 " 1000 " "**	**15.50**
" "	**—5 " 1600 " "**	**16.00**

If Push Button is wanted . . . 25c extra
If Condenser is wanted . . . . 50c "
If Direct Current Generator is wanted . 50c "

See Our Exhibit Electrical Show, Chicago, Illinois, January 16-30, 1909

Swedish-American Telephone Co.

Kansas City, Mo.
113.115 West 6th Street

Chicago

Houston, Tex.
505-507 Travis Street

Patterson Wireless Dry Battery Holder

and "SCREW TOP" CELLS are Invaluable in The Telephone Field

NO BINDING POSTS! NO CONNECTING WIRES!

Patterson Screw Top Cell

For as long as you can remember, you have thought of Battery Cells being connected up with **wires to Binding Posts!**

Perhaps it's occurred to you that the method was a **crude** one, but, perhaps, more than likely on the other hand, you've never given the subject much attention—certainly never appreciated how **really crude the Binding Post method was!**

The Patterson Screw Top Type Battery Cell, which is now regularly manufactured by the leading dry battery manufacturers of the country, will appeal to every telephone man in the country as **Ideal!**

Really it's the **logical, common sense way of doing,** and before long the Binding Post type of dry battery must appear as **"out of date"** as a wire-terminal lamp for commercial use would to-day seem!

Patterson Screw Top Type Battery Cells are made like cut shown above, with no projecting Binding Posts or carbons; they are mechanically and electrically correct for **every purpose where a Battery Cell is used.**

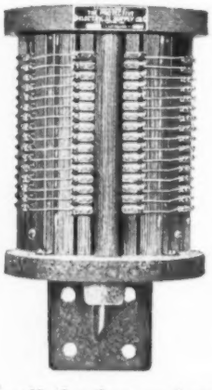
STANLEY & PATTERSON
Sole Manufacturers of Holders Only
23 Murray St., NEW YORK

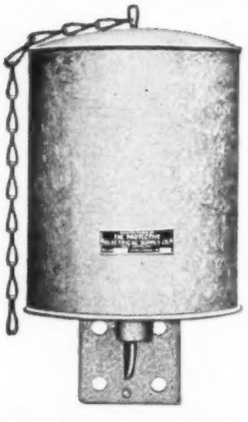
NOTE—Keep on using the **same make** of Dry Cell you like best, but when ordering, specify "Patterson Screw Top' in place of Binding Post cell.
All leading manufacturers of dry batteries will supply this type of cell.

Wall Set Fitted with Local Battery "Screw Top" Equipment

THINK-OF-IT

$1.75-ONE-DOLLAR-AND SEVENTY-FIVE-CENTS





is-all-the-fuse-maintenance-cost-for-this-CAN-TOP-CABLE-TERMINAL-to-Operate-an-Exchange-of-5000-SUBSCRIBERS-ONE-YEAR.

OUR-CATALOGUE-EXPLAINS-ALL.

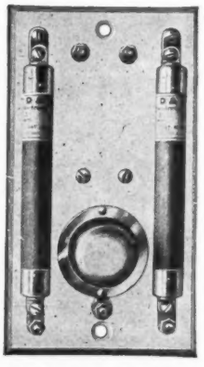
PROTECTIVE-ELECTRICAL-SUPPLY-CO.
FT. WAYNE, IND.

"D&W"

FUSES PROTECT

AGAINST SHORT CIRCUITS

Are Your LINES Amply Protected



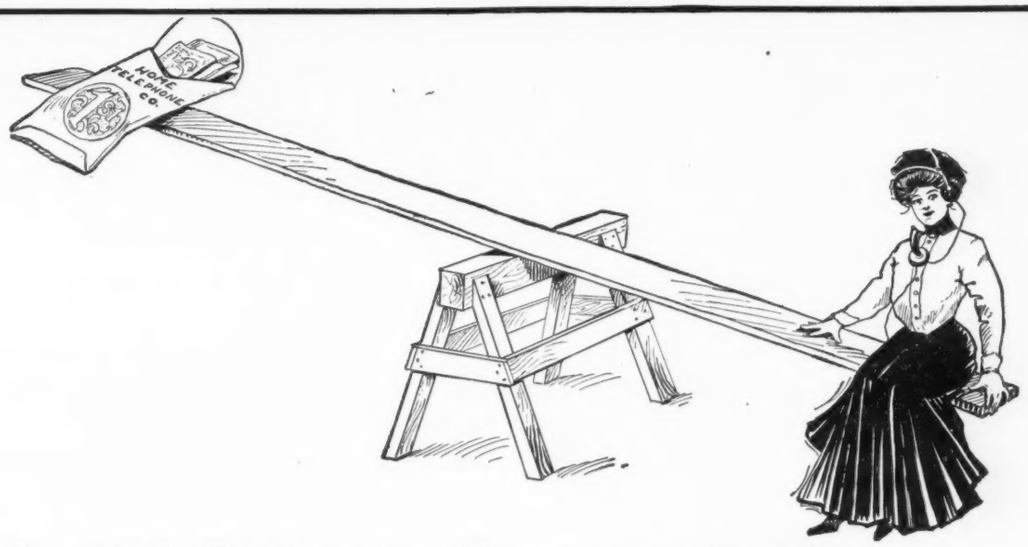
If Not TRY Our New Protector

CATALOG NO. 3105

FOR SUBSCRIBER'S PREMISES

D & W FUSE CO.
PROVIDENCE, R. I.

Please tell the Advertiser you saw his Announcement in TELEPHONY.



A 15% Raise in Operator's Wages

is the least that the engineers and owners of the largest manual telephone systems in the United States estimate will be necessary in the next decade. Women's wages are shown by the statistics to be advancing.

It is becoming more difficult

year by year to secure and maintain a competent force of operators, especially during prosperous times.

Remember this

when considering new equipment. The Automatic uses no operators, so all the troubles due to them disappear. The larger the system, the cheaper it is per 'phone to operate.

There is no "telephone paradox"

in the automatic engineer's calculations. There are no operator troubles for the manager. There is no deficit for the stockholders. There is satisfaction for everyone—but the competing company.

Our automatic system has been adopted in the following cities:

Aberdeen, South Dakota.
Akron, Ohio.
Allentown, Pennsylvania.
Auburn, Maine.
Auburn, N. Y.
Battle Creek, Michigan.
Beaver Falls, Pennsylvania.
Bellingham, Washington.
Berkeley, California.
Billings, Montana.
Butte, Montana.
Cadillac, Michigan.
Champaign, Illinois.
Chicago, Illinois.
Cleburne, Texas.
Clinton, Iowa.
Columbus, Georgia.
Columbus, Ohio.
Dayton, Ohio.
Decatur, Illinois.
Dowagiac, Michigan.
Edmonton, Alberta, Canada.
El Paso, Texas.
Emaus, Pennsylvania.
Fall River, Massachusetts.
Grand Rapids, Michigan.
Hastings, Nebraska.
Havana, Cuba.
Hazleton, Pennsylvania.
Holland, Michigan.
Hopkinsville, Kentucky.
Houston, Texas.
Jonesboro, Arkansas.
Kenton, Ohio.
Lake Benton, Minnesota.
Lansing, Michigan.
Lewiston, Maine.
Lincoln, Nebraska.
Los Angeles, California.
Manchester, Iowa.
Marianao, Cuba.
Medford, Wisconsin.
Mount Olivé, Illinois.
New Bedford, Massachusetts.
Norfolk, Nebraska.
Oakland, California.
Ocean Park, California.
Omaha, Nebraska.
Pontiac, Illinois.
Portland, Maine.
Portland, Oregon.
Princeton, New Jersey.
Richmond, Indiana.
Riverside, California.
Rochester, Pennsylvania.
Rushville, Indiana.
San Diego, California.
San Francisco, California.
Santa Monica, California.
Saskatoon, Sask., Canada.
Sioux City, Iowa.
South Bend, Indiana.
Spokane, Washington.
St. Marys, Ohio.
Strathcona, Alberta, Canada.
Tacoma, Washington.
Toronton Junction, Canada.
Traverse City, Michigan.
Urbana, Illinois.
Van Wert, Ohio.
Washington, Pennsylvania.
Wausau, Wisconsin.
Westerly, Rhode Island.
Wilmington, Delaware.

Automatic Electric Company

Van Buren & Morgan Streets, Chicago, U.S.A.

"Boston" Cable Clips

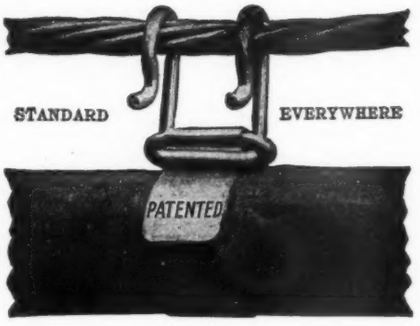
are known to a thousand and one construction foremen as the BEST Cable Clip on the market—they give the most satisfaction because of their simplicity, strength and reliability.

They are the most easily applied of any clip and do not cut cable or supporting wire so common among the ordinary sort.

The "Shawmut" Ground Connection Clamp is an all-copper clamp, copper-plated bolt, and is especially adapted for use in grounding wires. They are strongly constructed and are made in sizes from ½ inch to 3 inches.

Maximum Contact Surface

We are quoting specially attractive prices on each of the above articles for this month and should be of exceptional interest to concerns that are contemplating line improvement at this season.



Write for Prices and Descriptive Matter TO-DAY

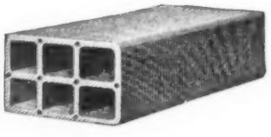
CHASE-SHAWMUT CO., Newburyport, Mass.

The Largest Manufacturers of Glazed Earthenware in the World

Factories in Five States

AMERICAN SEWER PIPE CO.

CONDUITS



GENERAL OFFICES PITTSBURGH, PA.

Breakage is a big item in ordinary conduit installations, averaging from 7 per cent. to 10 per cent. "from factory to ditch." In

Orangeburg Fibre Conduit

this loss is reduced to a minimum—the average loss being *less than 1 per cent.*

ORANGEBURG FIBRE CONDUIT is lighter and easier to handle. Is not apt to be injured if dropped or struck, and even though a section should be damaged the uninjured portion can be used by simply sawing off the broken parts.

Write for "The Conduit Book"—it contains much valuable information on conduit installations. Sent free on request.

The Fibre Conduit Company

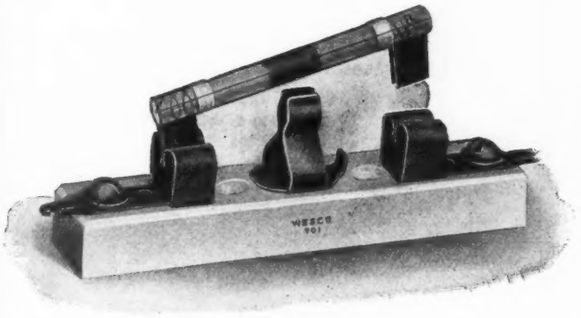
Main Office and Works:

Orangeburg, N. Y.

Chicago Office, 1741 Monadnock Building.
Pierson, Roeding & Co., San Francisco, Cal.;
Los Angeles, Cal.; Seattle, Wash.
McClary-Jemison Machinery Co.,
Birmingham, Ala.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Why Buy Any More Fuses



No. 701

INSTALL THE

WESCO TUBULAR LINE FUSE BLOCK

With One Set of Fuses

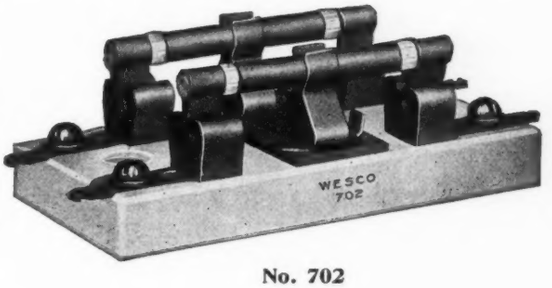
Then invest in fuse wire to the amount of your present cost of fuses for one month, and you will have five years supply.

THE GREAT EXPENSE OF CONSTANTLY REPLACING BLOWN FUSES IS DONE AWAY WITH BY USING

Wesco Refusible Tubular Fuses

For they are indestructible and so simple in construction that they can be refused by anyone without the aid of any tools.

The safety ground clip clamped firmly to the brass tube, for lightning escape, presents the most reliable and safest lightning protector ever designed.



No. 702

WRITE FOR SAMPLE—MAILED ON REQUEST

THE WESCO SUPPLY CO.

"PIONEER MANUFACTURERS OF TELEPHONES AND PROTECTIVE DEVICES"

FT. WORTH, TEXAS **St. Louis, Mo.** BIRMINGHAM, ALA.

Visiting telephone men who examined the

Excelsior

Auto-Cycle

AT THE

I. I. T. A. Convention

unanimously agreed that it is

The Motor Cycle

for line men's service

The **staunch construction, powerful motor, great carrying capacity** and **positive dependability** instantly appeals to the man who knows.

If you did not attend or did not see this machine while at the convention, write us and we will send fully illustrated catalog M. C. 9.

WRITE FOR IT TODAY

Excelsior Supply Co.

ESTABLISHED 1876

233-237 Randolph St., Chicago, Illinois

BRAINS?

Put your gray matter to work on this:

How much has it been costing you a year to buy horses, carriages, harness, etc.?

How much has it cost you per annum for stable rent, horse feed and care, shoeing, blacksmithing, etc.?

How long does it require to repair breaks and "shoot trouble"?

How many cases can you cover in a day?

In how many cases is speed, promptness, an important item to you and your subscribers?

WHAT IS THE ANSWER?
Here it is—and its picture

BUILT AND TESTED IN THE MOUNTAINS.

We build a motor cycle—with attachment for conveying materials and supplies—expressly for telephone companies. Get wise to this. It's a good thing for YOU.

Full Descriptive Matter on Request to Dept. T

Reading Standard Co. Reading, Pa.

HELLO! HELLO!

"Give me the Manager's Office."—"Is this the Manager's Office?"

"Mr. Manager, would you like to save a good pot of money in your construction and repair work?

You can do it by putting your trouble men on **Armac** Motor Cycles.

Wherever tried by telephone companies, they have been very successful and a great many machines are doing good work.

A Chicago city telephone inspector receives $180 a year for car fare which has more than paid for the machine the first year.

This man has ridden an **Armac** two years, 25 miles every day, without a breakdown; so can you.

The **Armac** Motor Cycle is the product of a $100,000 factory that is turning out the best material and workmanship.

EVERY *ARMAC* IS GUARANTEED

It is a durable, strong machine, one that can be depended upon and will stand the racket of rough roads.

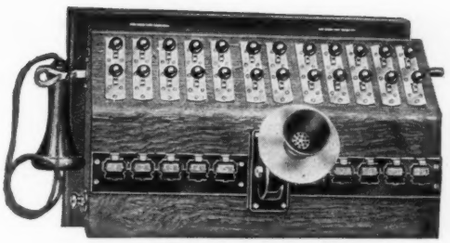
A fixture can be attached that will carry tools and wire over rear wheel. **The Motor Cycle is a necessity for telephone service.**

Write to us and we will send you information that will be of great value.

ARMAC MOTOR CO., 472 Carroll Ave., Chicago, Ill.

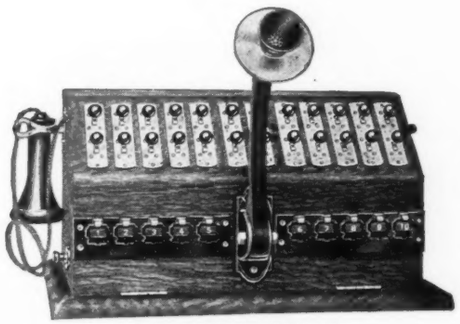
CORDLESS SWITCHBOARDS

For toll lines, rural switchboard station or small exchange, equipped for five or ten lines, either wall or desk type.



TEN-LINE WALL TYPE

A complete magneto telephone and switchboard, including line signals with quick remove coils, night alarm with switch and keys for ringing, listening and connecting.



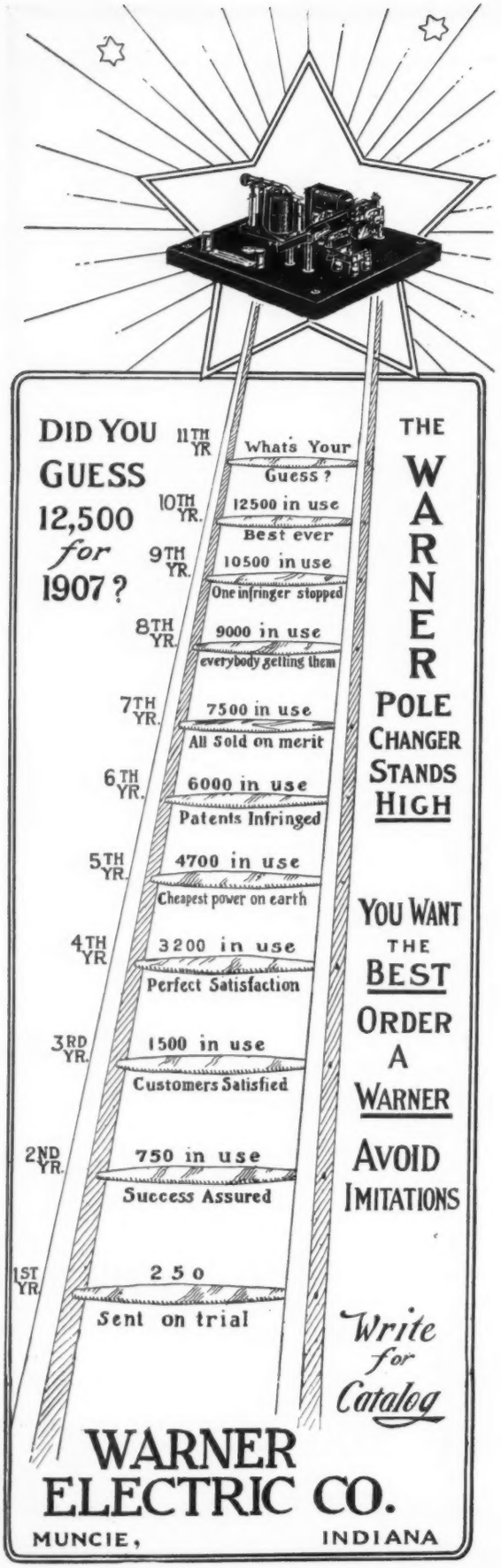
TEN-LINE DESK TYPE

The elimination of cords with their troubles and the advantage of being able to quickly group together any number of lines, makes this a very desirable piece of apparatus.

Century Telephone Construction Company

BUFFALO :: NEW YORK

Please tell the Advertiser you saw his Announcement in TELEPHONY.


DID YOU GUESS 12,500 for 1907?
11TH YR. What's Your Guess?
10TH YR. 12500 in use Best ever
9TH YR. 10500 in use One infringer stopped
8TH YR. 9000 in use everybody getting them
7TH YR. 7500 in use All Sold on merit
6TH YR. 6000 in use Patents Infringed
5TH YR. 4700 in use Cheapest power on earth
4TH YR. 3200 in use Perfect Satisfaction
3RD YR. 1500 in use Customers Satisfied
2ND YR. 750 in use Success Assured
1ST YR. 250 Sent on trial
THE WARNER POLE CHANGER STANDS HIGH
YOU WANT THE BEST ORDER A WARNER AVOID IMITATIONS
Write for Catalog
WARNER ELECTRIC CO.
MUNCIE, INDIANA

PRINTING

FOR TELEPHONE EXCHANGES

THESE ARE OUR STANDARD FORMS

Lease and Rental Records
Simplest form made
Cash Books
Toll Journals and Ledgers
Monthly Check Reports
Rental and Toll Bills
Combined Rental and Toll Bills
Trouble Tickets, Toll Tickets
Voucher Checks

THE BEST WORK *CHEAPEST PRICES*

Our Stock Form Toll Ticket is just the thing for you. The low price will surprise you. Let us quote you on your requirements.

We operate our own printing plant and all orders receive intelligent attention.

The Phonoprint Co., Defiance, O.

Ask for Catalogue, Samples and Prices

1909 Lease and Rental Records Now ready. Our stock size $4.00

The Mississippi Independent Telephone Association

at

Meridian, Miss., December 29th

with

Headquarters at the Meridian Hotel

All Independent telephone owners, operators, managers, or any one connected with the Independent movement in the South will do well to attend this meeting. Papers on different subjects will be read and the Independent situation in the three states, Alabama, Mississippi and Tennessee, gone into. The exchange of ideas, discussion with your fellow man, and social features will not be overlooked.

Also, the manufacturers will be represented and will display their equipment.

Don't Fail to Arrange to Attend This Meeting

Visitors especially invited

The Ericsson

TYPE "B"

Indicator Jack Switchboard

Let us figure on your switchboard requirements.

You will find our prices right, and the goods warrant the name "Superior Apparatus".

Our type "B" board is a board of features—good features every one.

On no other switchboard can an operator so successfully handle 200 lines.

All signals are mounted on an especially treated hard fibre panel flush with the face of the board, presenting a very neat appearance.

The Ericsson "Indicator Jack" occupies but one-half the space of other line signals.

The signal is given by a white thimble protruding from the face of the board. It cannot be restored except by inserting the plug, which requires the operator to answer every call.

The labor of the operator is further reduced by the automatic clear out drops, which are restored when the plugs return to the plug seats.

200 LINE TYPE "B" OAK SWITCHBOARD

Write us when next in the market, Let us show you how to reduce your operating expenses

L. M. Ericsson Tel. Mfg. Co.

Buffalo, New York

Read Over the Following Facts

They tell you a few of the "whys" and "wherefores" of ERICSSON SWITCHBOARD APPARATUS

A few features peculiar to Ericsson Common Battery Boards that appeal to every exchange operator follow:

FIRST — The line relay controls the line lamp with one single contact. There are no contacts in the line circuits.

SECOND — Our relays do not stick.

THIRD — There is no annoying click in the subscriber's receiver when the operator answers.

FOURTH — No cross talk occurs in our equipment.

FIFTH — Only two wires are used in the multiple and for the intermediate field jumpers.

SIXTH — All wearing surfaces on the board are covered with an indestructible, non-shrinking fibre.

SEVENTH—We use multiple "weaves" instead of cables, making all wires easily accessible.

Our "Indicator Jack" enables us to build magneto multiple switchboards in which the multiple field is no higher than in the common battery boards; this, combined with the automatic action of the "Indicator Jack" and the self-restoring clear out drops, renders our magneto multiple board as rapid in operation as a common battery equipment.

Let us figure on your switchboard equipments. We are prepared to build local or common battery multiple switchboards of any size, and our Engineering Department will gladly furnish all information, plans, or specifications covering your requirements.

Nothing is too large or too small to deeply interest us. Write us that we may submit specifications and figures.

L. M. Ericsson Tel. Mfg. Co.

Buffalo, New York

A Card of Thanks

A Prospective Purchaser carefully inspected the convention exhibits of every telephone manufacturer.

Each Competitor of ours took particular pains to show why his equipment was better than Dean.

The Customer became curious and examined our goods with especial care.

He Bought a Dean board because he found that every criticism was based on some exclusive Dean feature.

Which Reminds Us of what the Manager at Deshler, Ohio, told our respresentative:

¶ "The tree with the most clubs around it, bears the best fruit."

The Dean Electric Company
Elyria, Ohio, U. S. A.
San Francisco Kansas City

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Ask for Catalog 256-J

The Westinghouse Machine Company

Storage Battery Department
East Pittsburg, Pa.

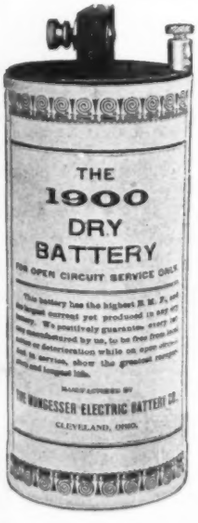
Gould Telephone Storage Batteries

DESIGNED with a full understanding of the conditions of telephone service and built electrically and mechanically to meet these demands.

Gould Storage Battery Co.

MAIN OFFICES: 341-347 Fifth Ave., New York City
Works, Depew, N. Y.
SALES OFFICES: Chicago—Rookery Building
Boston—89 State Street
San Francisco—Monadnock Block
Toronto, Ont.—2 Bloor St., E.

Get the Real Thing in Dry Batteries
THE "1900"



Get a Battery that you can count on to do what is expected of it

The usual low priced battery is a cheap imitation of the high priced cell, with the *pretense* all there and the *quality* left *out*.

The "1900" is the battery of QUALITY

The Nungesser Electric Battery Co.
CLEVELAND, OHIO

GENERAL SALES OFFICE
128 WEST JACKSON BOULEVARD, CHICAGO

Absolutely Dependable

ALL SIZES

together with

LONG LIFE

are the two strong points about

HELLO Dry Cells

Powerful and Sure the

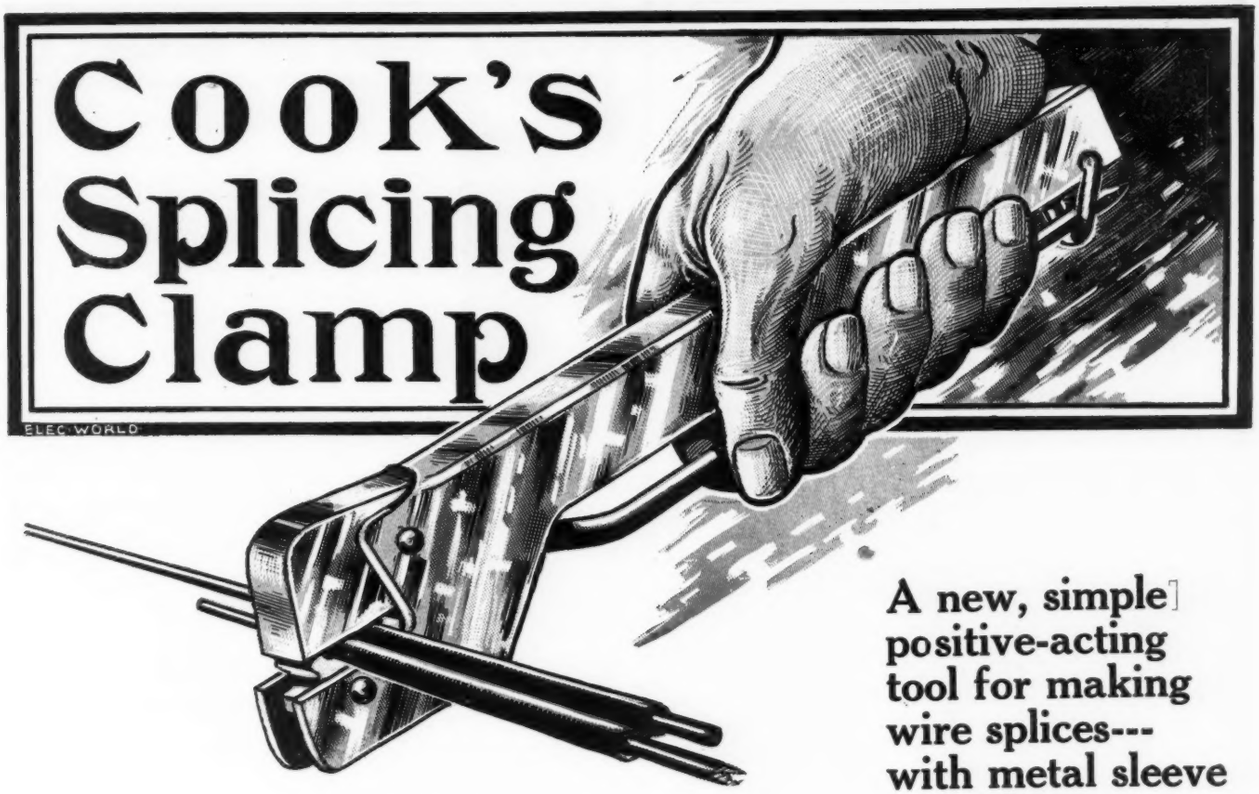
HELLO

can ALWAYS be DEPENDED upon in every situation and emergency.

No test of actual service has shown them lacking in any way.

STACKPOLE BATTERY CO., St. Marys, Pa.
CARBON PRODUCTS
WESTERN OFFICE: F. J. Alvin, Sales Manager, Northwestern Block, Room 402, Lake St. and Fifth Ave., Chicago, Ill.

Cook's Splicing Clamp



A new, simple positive-acting tool for making wire splices--- with metal sleeve or without.

It is a compact tool that can be conveniently carried in belt or pocket. It does not have to be passed over the wire or sleeve and is as easy to use as ordinary pliers. It does not injure the coating or galvanizing of wires or sleeves. Made in two sizes that cover every requirement. Black or nickel finish. Write today for prices and descriptive circular.

WESTERN UNION SPLICE STARTED

SLEEVE SPLICE COMPLETED

Frank B. Cook.

242 W. Lake St.,

Chicago, Ill.

Transmitter
Mouth Pieces
and
Moulded
Telephone
Appliances

OUR QUALIFICATIONS—Largest plant in the world, finest equipment procurable, thirty years' experience.

The Scranton Button Co.
Scranton, Pa.

Catalogs on Application
Inquiries Solicited

Western Representative
H. E. COBB
1530 Monadnock Bldg.
Chicago, Ill.

General Insulate and Machine Co.

Manufacturers of

Seamless Receiver Shells and Mouthpieces

Handles, Knobs and other Insulations for the TELEPHONE and ELECTRICAL TRADES.

"Insulate" Composition represents highest quality material, and unexcelled mechanical details.

Our products are a positive guarantee for the BEST. They are used by the leading and largest concerns in the country.

General Insulate and Machine Co.
Western Office—A. J. Cox & Co., Chicago
Stock Exchange Building, Chicago, Ill.
Factory and Home Office—1008 to 1014 Atlantic Ave.
Brooklyn, N.Y.

Inland Telephones and Switchboards
ARE PERFECT

Get our prices on
Bridging Telephones, Series Telephones' Desk Telephones, Magneto Bells, Extension Bells, Transmitters, Receivers, Induction Coils, Dry Batteries, Switchboards, Operators' Receivers, Operators Transmitters, Construction Material and all other Exchange Equipment.

All orders shipped same day on which they are received

INLAND ELECTRIC COMPANY
211-213 CHESTNUT STREET :: :: ST. LOUIS

"REBUILT"
TELEPHONE EQUIPMENT
is "REBUILT" not "REPAIRED"
One's like "New," the other's "Old"—always will be

Our "Rebuilt" Equipment Department "Rebuilds" Switchboards—Telephones—Apparatus—Additional Switchboard Equipment—and Handles—Wire—Cable—Cords—Everything Telephonic.

GUARANTEED SAVING 30 TO 50 PER CENT

Get Quotations, and if you want our "Rebuilt" Bargain Bulletin sent you regularly—say so—it's FREE. *Address*

"REBUILT" EQUIPMENT DEPARTMENT
PREMIER ELECTRIC CO.
VAN BUREN & CLINTON STS. CHICAGO, ILL.
Remember "Rebuilt"—Not Repaired

THE K. B.
LOCKOUT SYSTEM
Will save you Money. The best and most economical System on the Market. Write for descriptive Circulars and further information.
THE DAYTON TELEPHONE LOCKOUT MFG. CO.
DAYTON, OHIO

TELEPHONE EAR CUSHION Cuts Off All Outside Noises
Samples FORTY CENTS, Prepaid
This pneumatic cushion is made of the softest rubber and can be adjusted to the hard gutta-percha receiver very readily. The cushion conforms to the exact shape of the ear as such an air pad alone could, cutting off outside noises and giving the ear a comfortable cushion instead of a rigid receiver. Holds the ear-drum further from the receiver, and by virtue of the air and flabby rubber cushion it neutralizes the harsh crash! crash! noises. Made by
HURON RUBBER COMPANY, CLEVELAND, O.

THE SEYMOUR MFG. CO.
SEYMOUR, CONN.
GERMAN SILVER
RESISTANCE SHEET AND WIRE
COPPER WIRE
BRASS, BRONZE AND COPPER

Dealer in Independent Telephone Bonds and Securities. Publisher of Swartz' Telephone Siftings. 25 cents a year. Address
IRA T. SWARTZ
Office 201 New Oddfellow Building—Lock Box 423
INDIANAPOLIS, IND.

FOURTH ANNUAL

Electrical Show

COLISEUM, CHICAGO

January 16 to 30, 1909
INCLUSIVE

The one and only great display of everything new in the field of Telephony. If you have not already contracted for exhibition space write or wire for rates, diagrams or other information

ELECTRICAL TRADES EXPOSITION CO.

1006-7 Monadnock Bldg.
CHICAGO

Special Grand Telephone Meeting Jan. 26th and 27th

THE greatest electrical event of each year is this wonderful exposition of electricity. One can gain a greater knowledge of all things electrical by visiting this show than one could otherwise in a life time.

JANUARY 26th and 27th

HAS BEEN SET APART FOR A **GRAND TELEPHONE MEETING** OF TELEPHONE MEN from all over the world. Magnificent telephone exhibits by the largest manufacturers will be installed and will furnish free tickets of admission to their friends and customers upon application.

Arrange for your trip to Chicago during this Exposition. You will be well repaid by the many new inventions and discoveries shown.

ELECTRICITY in all its applied uses will be shown and demonstrated; costly and elegant souvenirs will be given to visiting telephone men, and an entertainment on a lavish scale is being prepared for them.

This will be the greatest and largest gathering of telephone men in the history of the business.

Remember the date, Jan. 16th to 30th, inclusive.

GRAND TELEPHONE MEETING JANUARY 26th AND 27th

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Belden Wire

We can fill your orders from our large Chicago stock for

MAGNET WIRE

SWITCHBOARD and JUMPER WIRE

ANNUNCIATOR and OFFICE WIRE

RESISTANCE WIRES
(German Silver, IA-IA, Superior & Krupp)

RUBBER COVERED TELEPHONE WIRES

COPPER CLAD DROP WIRE

LINE WIRES
(Copper, Copper Clad, and Galvanized Iron)

OFFICE ANNUNCIATOR CABLES

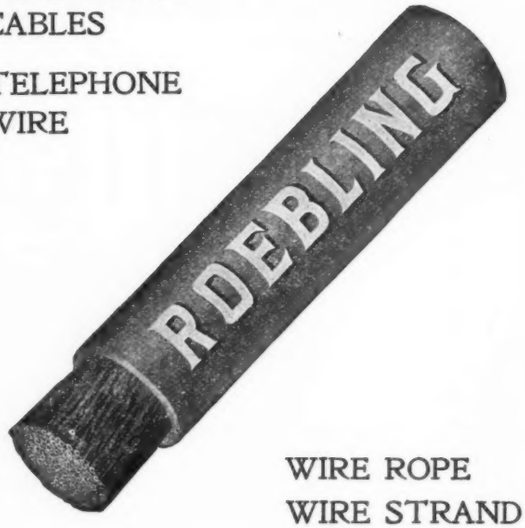
Write for Prices

BELDEN MANUFACTURING COMPANY
194 MICHIGAN STREET, CHICAGO

2

TELEPHONE CABLES

TELEPHONE WIRE



WIRE ROPE
WIRE STRAND

JOHN A. ROEBLING'S SONS CO.
TRENTON, N. J.

COPPER-CLAD STEEL WIRE

Fire Alarm. Police Telephone. Signal Wire. :: High tensile, non-corrosive

CARRIED IN STOCK AT CHICAGO, ST. LOUIS, FORT WORTH

MANUFACTURED BY

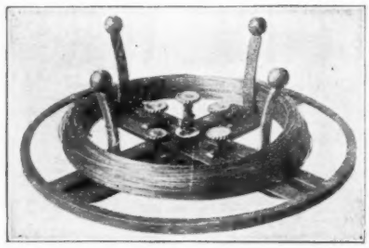
Duplex Metals Co., 208 Fifth Ave., New York

WILLIAMS TEST CLAMPS

Will pay you a fine profit in the saving of labor and material. They save skinning—they save re-taping—they save time—they save the wire. Send 75 cents for a pair (two), postpaid, on 30 days' trial. Your money back if you want it.

THE WILLIAMS TEST CLAMP CO.
720 Electric Bldg. Cleveland, O.

McMAHON WIRE REEL No. 2



Adjustable to any size coil. Equipped with adjustable friction brake. Designed for small or large wires. Saves labor.

McMAHON CABLE GRIP

Grips but six inches of cable. Will not cut sheath, break the seal or injure the core. Connected and removed instantly.

HALLETT IRON WORKS
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American Steel & Wire Company's

W. & M. Telephone Wire

IS made of materials selected and tested in all the stages from our own mines to the finished product. The employment of specially adapted metals is of greater importance in telephone wires, because not alone must tensile strength be considered, but electrical conductivity as well. To attain both these and in addition apply a quality of galvanizing that will effectually protect against weather conditions, is a triumph of the wiremaker's art. It is accomplished only with the greatest facilities for manufacture and an organization trained to the highest standard of excellence. Our brands illustrated below represent the best that experience, skill, facilities and hard and painstaking study can produce.

Chicago New York **AMERICAN STEEL & WIRE COMPANY** Denver San Francisco

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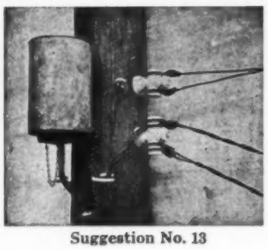

Suggestion No. 13

Suggestion No. 2

Universal Insulators

SOME ADVANTAGES:

Low first cost.
Cheaper than iron or wood brackets—Easily attached—
Labor Saving.—A separate groove for each wire—
Grooves for all directions.
Reduced maintenance.

Write for Descriptive Literature

Universal Specialty Company
116 S. Seventh St. Terre Haute, Ind.

Suggestion No.5

Suggestion No. 8

The Ford & Johnson Co.

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Telephone Switch-Board Chairs

SEND FOR BOOKLET

Our Telephone Chairs are made according to approved specifications and are used by many of the large Telephone Equipment Companies. The Chairs are made in selected oak or birch, finished golden or imitation mahogany, polished finish.

No. 231.523 Switch-Board Chair — The back is made at right angles with seat.

No. 228.523 Private Switch-Board Chair — The back has regular angle with seat.

No. 30.523 Switch-Board Chair — Adjustable back; any any angle.

Can be had in Cane or Wood Seat; also the proper height for any Switchboard.

Never Throw Away a Battery Cell

until you know that its days of usefulness are past. You don't know this in every case without the right instruments.

"Connecticut Pocket Meters"

should be in every trouble man's kit. They measure volts and amperes. Durable, accurate, inexpensive.

CONN. TELEPHONE & ELECTRIC COMPANY, Inc., Meriden, Conn.

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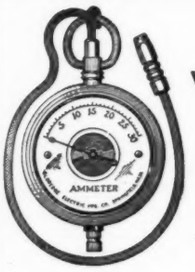
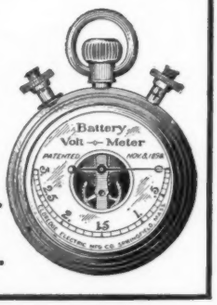
POCKET

Voltmeters, Ammeters, Volt-Ammeters

Miniature Switchboard Instruments

Sold by supply dealers or send direct





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Springfield, Massachusetts, U.S.A.

TYPE C 25 VOLTMETER

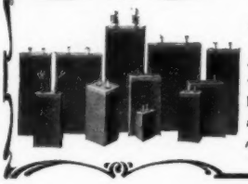
Diameter of Face, 2 1-2 in. Overall Diameter, 3 in. D'Arsonval Type

Accurate; dead beat; fully guaranteed. Sent on 30 days' approval. Made in the following ranges: Ammeters. 1-100 ampere to 30 amperes. Voltmeters, 1-100 volt to 25 volts.

Price, $7.50 and upwards

Ask for Bulletin AT

Hoyt Electrical Instrument Co.
Penacook, N. H.



We Make Telephone Condensers,

Absolutely Air Tight and Moisture Proof, with High Insulation Resistance, High Break-Down Test and Uniform Capacity, which are Essential to Long Life and Good Service.

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Jewell Meters

For Wire Chiefs' Desk

These instruments of the highest grade and moderate in price. It would pay you to investigate. Catalogue upon application.

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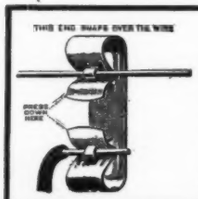

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For connecting bridging 'phones to party line wire. One end snaps over the tight line wire. No dead end needed. Connects iron wire, copper wire or iron to copper wire. Positive spring contact.

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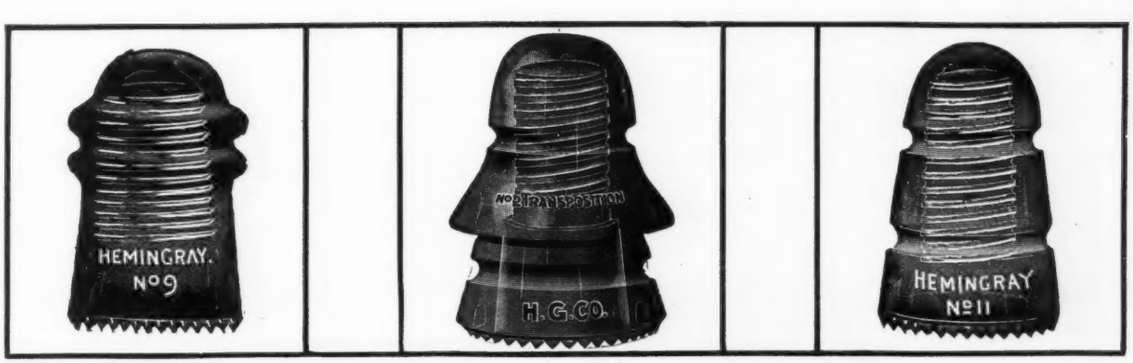

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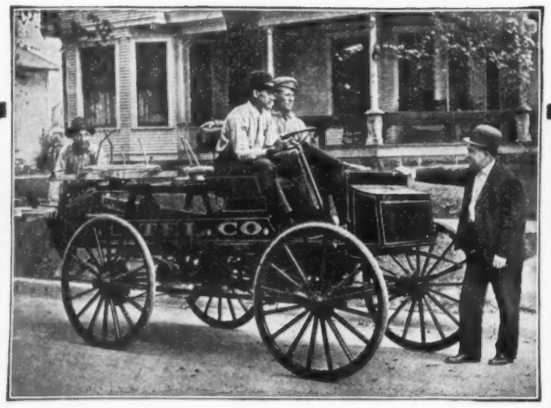

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Want a "Trouble" Wagon?

LISTEN—

This wagon made 616 miles during 20 days—No delays—No trouble—Oil cost $8.67—Repairs 70 cents—Saved one man's time and reduced livery expenses 70%. You can't afford to be without one. Write today. A few details—double cylinder, opposed, 4 cycle, air cooled, planetary transmission, chain drive, 16 H. P., wheel steer, solid rubber tires. Always ready—no hitching or unhitching—good in all weather on all roads summer and Winter—a great hill climber. **Write today for Catalogue 100**

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Messenger Wire Grip

It is of vital importance to all having strand wire to handle to investigate this Grip. We have excellent testimonials from users.

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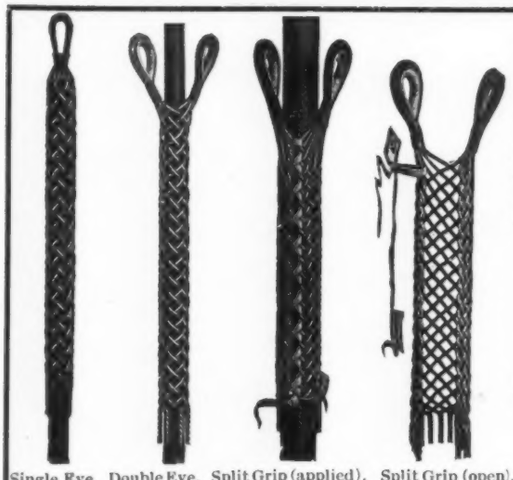

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"Gem" Wire and Cable Grip save their cost in the first pull

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Perfection Reel Stand

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Write for Descriptive Matter and Prices

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Before installing a new system, you ought to know all about Okonite Insulated wires and cables. Tell us your plans and we will submit information that applies.

Years of experience have given us a fund of information of great value to you. Okonite is unexcelled for interior telephone wiring. No repairs, no replacements—time saved and trouble avoided. Okonite does not deteriorate but improves with age.

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Complete Stock *Prompt Shipments* *Low Prices*

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Mr. Telephone Manager

Bulletin 18 **Read It!**

"Effect of Cold Weather on Dry Cells"

Also bulletins 15, 16 and 17. They will help you in your business.

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A New Soldering Flux for All Metals

Ruby Fluid possesses marvelous qualities and is probably the greatest of modern inventions relating to the metal trades.
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Ruby Fluid never attacks metal or any form of insulating material, yet it is the quickest tinning compound known for brass or copper.
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TELEPHONE RANDOLPH 330

Changes in Equipment

or terminal arrangement of lines may enable you to give better service or reduce expense. Properly taken peg counts will indicate what changes are desirable. The

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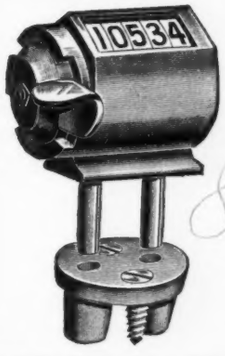

makes it possible to make such counts without interfering with or hampering the service. There's a special type for telephone work. Our pamphlet explains its many uses. Write for a copy.

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Manufacturers of Cyclometers, Odometers, Tachometers, Tachodometers Counters and Fine Castings

Represented in Great Britain by Messrs. Markt & Co., Ltd., 6 City Road, Finsbury Square, London, E. C., England

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Telephone Booths

are Necessary in Long Distance and Improve Local Service.

Write for Catalogue.

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Reasons more than one there are why before placing orders for Telephone Booths you should post up on the best line in the country, individually and collectively. Write and see what can be accomplished.

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TELEPHONE BELL

In designing the Bell we embodied a combination of features to produce a bell of the same high efficiency that has characterized our general line of signal bells, to which we invite your inspection.

Sizes of gongs, 2½ in. to 10 in. All resistances. All weather proof. Efficiency, durability and price will interest you.

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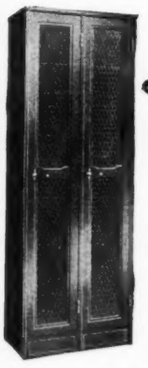
The Spools are large enough so that in no case is it necessary to use over No. 35 Magnet Wire, thereby obtaining the maximum number of amphere turns, and this wire is *all active*. The armature is under the influence of the coils its en tire length.

Durability

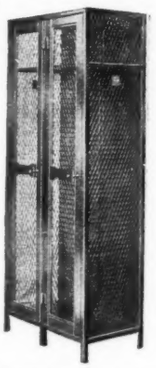
The Poles are arranged in such a manner that the permanent Magnet cannot be discharged, and will not weaken in any service.

SCHWARZE ELECTRIC CO. Main Office and Factory **Adrian, Mich.**



Allsteel

CLOTHING LOCKERS



solve most economically, and for all time, the problem of providing serviceable locker equipment. Unit principle Maximum ventilation; absolutely sanitary. Fireproof and thief proof. An everlasting finish of baked-on enamel, in olive green or any other color desired. Booklet TY, sent on request, illustrates and describes ALLSTEEL Locker stock types. Write for it. Study it carefully before buying locker equipment.

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YOUNGSTOWN, OHIO

J. W. MIDDLETON & CO.

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NEW ELEGANT STEEL VIGNETTES

Publishers of **Inter-State Corporation Record** containing all Forms and Blanks for Organizing a New Corporation

Stock Certificates, Bonds, Corporate and Notarial Seals, Blank Books, Printing, Lithographing

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American Conduit Company

Manufacturers of BITUMINIZED FIBER CONDUIT

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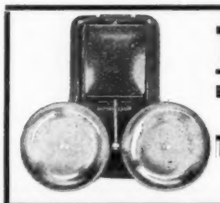
JOHN A. ROEBLING'S SONS CO.

San Francisco Portland Seattle

Never Slip Wire Grip

ALWAYS READY
EASY OF ADJUSTMENT

No time lost in attaching to wire. For further information write to **GEO. H. GLASS & CO., Pekin, Ill.** or your supply house.



This is a Noisy One

Even a boiler shop cannot provide noise enough to drown it. Wound for all standard resistances

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Chicago, Ill., and Boston, Mass.

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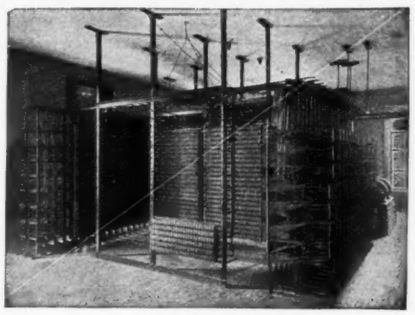

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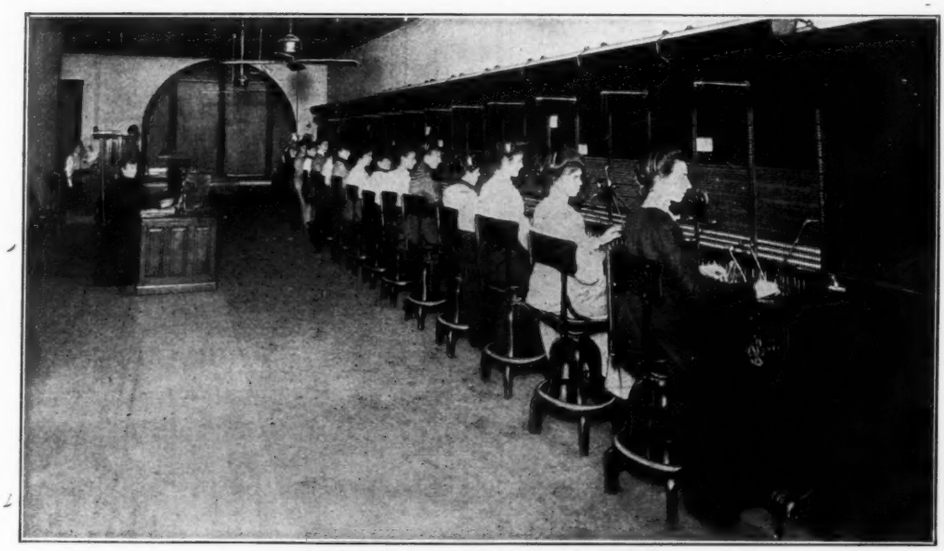
COMPLETE

Power Plant

COMMON BATTERY EXCHANGE



5,000 Capacity, 2,000 Wires Installed

Simple in construction, yet perfect in operation. Lowest in maintenance cost. No complicated circuits, absence of click when answered by operator, quiet lines under all conditions.

Rear View of Board

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La Fayette - Indiana

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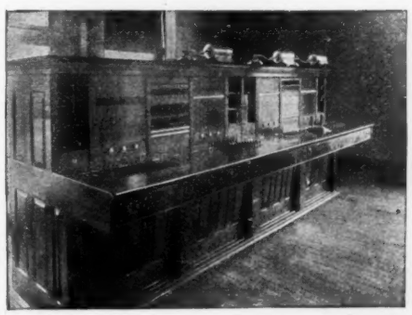

4 Position Toll Desk

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WILL IT PAY?

Of course it will,
when it doubles the life of your

POLES and CROSS ARMS.

That's why the best men in the telephone business are taking to

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The Perfect Cold, Hot Brush and Open Tank Timber Preserver

PRESERVATIVE POLE AND ARM STAINS
All Colors—Reds, Browns and Greens
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(INCORPORATED 1892)
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"C. A. Wood Preserver" (Carbolineum America)

Is composed of over 90% of the highboiling oils, guaranteed to meet most rigid specifications for wood preserver

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POLE LINE HARDWARE

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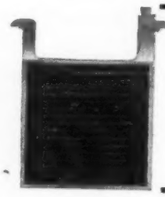

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Used Exclusively in ZOAR Stationary Batteries

These plates are formed with UNITS, each UNIT presenting four sides, instead of two, to the penetration of the electrolyte, guaranteeing uniformity during rapid discharge with great volume. Agents wanted. Write for circular.

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WIRE CHIEF'S
VOLTMETER

The Weston Wire Chief's Voltmeter, Model 57, is an instrument specially developed with reference to the requirements of Telephone Companies. With it the Wire Chief is enabled to make rapidly and accurately a large number of the tests of lines necessary to locate the nature of defects and assist him in bringing and keeping the system under his charge up to the highest possible point of efficiency.

WIRE CHIEFS' VOLTMETER—Model 57

An increase in efficiency of 25 per cent has been reported as a result of the use of these instruments in large stations.

Write for circular, giving full particulars of this instrument, also for any information desired concerning our extensive line of high grade and low priced Switchboard-Portable and Laboratory Instruments for use on either direct or alternating current circuits.

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Paris, France—E. H. Cadiot, 12 Rue St. Georges
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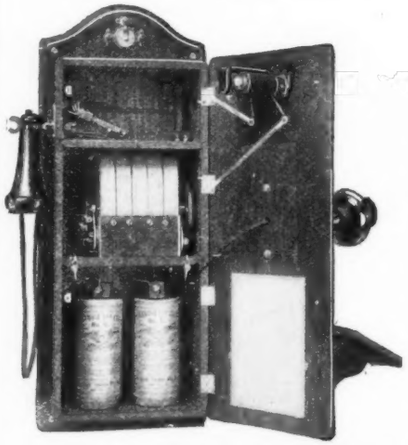
ON RURAL 'PHONES

That which interests YOU most in the ADVANTAGES WE ENJOY, are the very attractive prices we are in a position to quote you.



5-Bar gen.
1600 Ohm.
Ringer.
Holds 3 batteries.
Fully GUARANTEED.
Other 'Phones at Low Prices.
Write to-day.

Lots of 5 - LOWER THAN YOU EVER PAID BEFORE.

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SUMTER, S. C., U. S. A.

Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine and The Telephone

Vol. XVI — CHICAGO, SATURDAY, DECEMBER 26, 1908 — No. 20

PUBLISHED EVERY SATURDAY BY THE

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Telephone Harrison 2951

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W. H. Graffis, 2d Vice-President — H. D. Fargo, Secretary-Treasurer

Edited by H. B. McMeal and Franklin H. Reed

The present publication comprises

Vol. 55	The Telephone	No. 20
Vol. 32	Telephone Magazine	No. 20
Vol. 18	American Telephone Journal	No. 26
Vol. 16	Sound Waves	No. 20
Vol. 16	Telephony	No. 20

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CHICAGO, SATURDAY, DECEMBER 26, 1908.

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Why Are Not All in Favor of Competition?

Judging by the lack of success which has attended efforts to eliminate competition from many cities, people want competitive telephone service. The history of the telephone business records many instances where, combinations having been made, a new competing plant built subsequently has received ample support from citizens who became not only subscribers, but stockholders as well. Failure of future attempts to eliminate competition may be safely predicted on the ground that the public does not want a "monopoly" service, and will aid an honest, intelligently managed attempt to establish a new system.

In every village one finds dogs which follow the wagons of strangers. So, likewise, in every community or body of men, there will be found some ready to take up words which are given them, and repeat them in an effort to create the illusion that these sounds express ideas which they have conceived, or convictions which they hold. Such expressions betray their origin by their form. It is probably true that without an exception the statements in favor of a "single telephone system" have originated with, and been spread at the instigation of persons whose business interests lie with that organization which has as a central feature of its policy the purpose of reestablishing a monopoly of the telephone service, at its own price. They do not represent any real, spontaneous public sentiment, such as is usually the outgrowth of beliefs originating with persons who have no selfish aims to forward, and is the foundation of movements for the public good.

It is perhaps true that the maintenance of competition has in some places cost a few persons an amount overbalancing the value of the benefits which they have received. The fundamental law of trade, by which alone it exists, is that it brings gain to participants in its transactions. That gain for one party is on occasions but the complement of a loss for the other is no foundation for an argument that trading should cease. It simply means that the weaker parties need to acquire more skill in conducting the affairs in which they engage. To a large degree such failure to obtain the best results as has been recorded in the telephone business has been due to a lack of realization that the business must be conducted to meet the conditions which the necessary permanent existence of a state

of competition enjoins, and to build and operate accordingly.

This unfortunate condition is probably due in large measure to the fact that until very recently telephone men themselves have been wont to view the subject of competition, and its advantages and disadvantages, as an object of sentiment, and have not applied the tests of fair statements of fact, and sound, logical argument. It is noteworthy that even the most plausible arguments in favor of combination are based upon premises of an ideal which men of experience conceive to be impractical, and unattainable, and so are void because they have an unsound foundation. And the promotion of combination, when successful, has not been carried on by arguments bearing on its being essentially good, but rather by threats of what may be done if such combination is not made. Combination, where brought about, may fairly be said to have been achieved by force, rather than by argument. We seem now to have arrived at the point where the subject is being considered more carefully, and analyzed with thorough and minute attention.

Mr. Johnston's article, begun in other pages of this journal, is a most valuable summing up of the good which accrues to the public, and to telephone men, from competition. He shows what competition is worth. And we cannot see how any reasonable and well informed person, who will read this paper, and apply to the arguments the information gained by his own observation, can avoid the conclusion that the benefits of competition are worth all they cost, and much more.

Transmission.

Statistics from exchanges in all parts of the country show that long distance telephone messages are increasing in number, and in average length, from year to year. This condition is a most satisfactory one to local telephone companies, many of whom are becoming interested in movements to still further develop this profitable business by devoting increased attention to building toll lines, and keeping them in the best condition for service.

The improvements in facilities for the interconnection of Independent exchanges in the past year have been many; and so widespread is the desire to build up toll receipts, that even the owners of small rural lines are showing subscribers how to use the telephone to save time and carfare, and make money.

This kind of development is not to be achieved without effort, and it is becoming well known that all departments must co-operate to build and maintain circuits in such condition that they will be capable of handling this high-return business. Future local exchanges must be engineered from sub-station, through the cable, all the way to central office equipment as much for efficient transmission over toll lines as for good local operation. After the long distance lines are built and connected, nothing less than first class testing equipment, attended by alert and well trained men, will suffice, if business is to be held and increased. To enable patrons to talk easily over as long a line as they care to use is the aim of our companies at present, and they realize that to accomplish this they must not only build right in the first place, but keep the whole plant in the best condition all the time.

Business Prospects for 1909.

The closing weeks of this year have been marked by a very material improvement in the outlook for a substantial growth of the telephone business during the next twelve months. Affairs seem to have passed the stage where predictions of a good future are confined to the confirmed optimists, and the encouraging signs which may be noted in all parts of the field are taking on a decidedly substantial character.

For some time past, it has been evident that most telephone companies would be able to put into service all the facilities they can provide by exercising a reasonable diligence in securing funds. The pleasant thing is that the men who are doing the financing are now finding it easier to carry out their plans than they had anticipated. Orders for material are beginning to appear in good numbers, and not a few companies are making plans for very comprehensive enlargements, which they will begin early in the Spring.

It is expected that certain disturbing situations which have been growing toward a climax, in some sections, will have been safely settled by that time, and there will be no serious obstacles to a consistent development. The fact that there is much new territory open for legitimate development by Independent companies is another point which should not be overlooked, and the extent of the telephone growth which may be expected to result from this condition alone is to some degree indicated by the number of new companies whose organization is being reported from week to week.

The Sherman Law and Publicity.

Now that the Sherman law is proving to be a measure of some force, it is coming in for some hard knocks. The "powerful offenders" object to it. One of its features which they do not like is that it furnishes a lever by which their acts are forced on the attention of the public. There is no doubt, for example, that the information brought out by the filing of the papers in the Ohio suit, on which Judge Tayler granted a temporary injunction against interference with the Independent telephone business, has been of great benefit to Independent telephone companies all over the country, through its publication in newspapers.

Another action, which has probably not received the publicity it merits, is the one recently heard in Boston, resulting from dealings in the Telephone, Telegraph & Cable Co. of America. Ever since this giant corporation was squelched there have been persistent rumors of a scandal ready to be aired before the public. The character alike of the efforts exerted, and the agents employed to eliminate this prospective competitor from the field, have come in for much attention. It is to be hoped that in time the public may be put in possession of the facts in this case.

History of the Automatic Telephone*

By Arthur Bessey Smith

Assistant Professor in Telephone Engineering, Purdue University.

After the Fall River board, the next important installation was at Chicago, Ill. The Illinois Tunnel Company had secured a franchise for the construction of subways for telephone wires and decided on automatic equipment for the exchange. It was planned to serve only the down-town business district known as the "Loop," bounded by Lake and Van Buren Streets, and Wabash and Fifth Avenues.

The installation of the switchboard was begun Dec. 20, 1902. Switches for 10,000 lines were put in, making the largest single office automatic exchange which had been installed at that date, February, 1908. A certain special requirement was encountered in Chicago which made the work of the automatic engineers more difficult than it had been at New Bedford or Fall River. The Chicago Telephone Co. was offering to the public and operating successfully a measured service on a good common battery manual switchboard. Clearly no flat rate system would do here. The automatic people must meter their calls also. But with their usual energy they had attacked the problem, and were ready with a system which fulfilled their needs. We shall take up the regular operation and features first, discussing the special points as they come up.

The substation sender, with hook and release springs is shown in its normal position in Fig. 67. A portion of the hook lever proper is shown at the right. It is insulated from the framework. Five hook switch springs are shown at 11, 12, 13, 14 and 15. Spring 11 is permanently connected to the frame and carries the vertical line. The lug, 10, on that portion of the hook lever which is connected to the frame, operates the long spring 13, which, through the rubber insulation, also moves the springs 12 and 15, above and below. Attached to the dial shaft is the curved arm 16, resting normally on the spring 11, acting as a stop for the latter. The straight lever 20 is made in one piece with 16, and carries a pin, 21, whose screw head only can be seen, the pin being on the back of the lever. The force of the dial spring causes the lever 20 to rest against the stop 27. The irregular shaped lever, 22, is pressed downward by a spring. The lower end of 22 locks the pin 21 on lever 20, so that the dial can not be turned until the receiver is taken from the hook. The provision of this dial lock was another step in the process of making the automatic sender "fool proof." The ground spring, 7, is held from contact with the instrument ground, 8, by the insulation, 9, resting on 25, the end of lever 22.

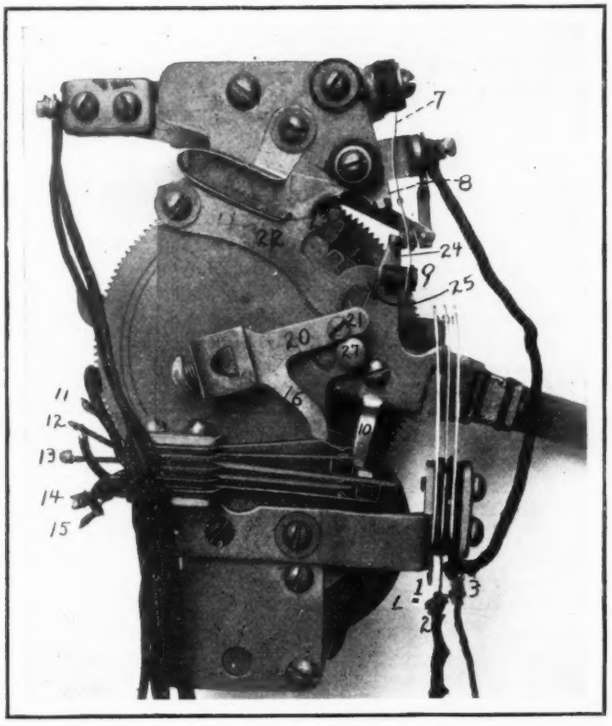


Fig. 67—Chicago Substation Sender, with Hook Down.

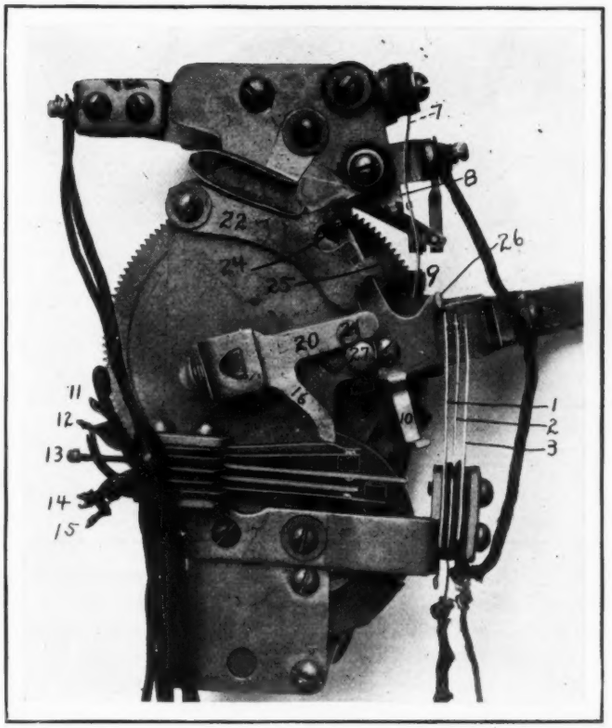


Fig. 68—Condition of Chicago Substation Sender with Hook Up.

When the receiver is taken from the hook the lever rises, as in Fig. 68. The lug, 24, on the hook lever pushes on a prong, 23, lifting the irregular shaped lever, 22, so as to unlock the dial. It will be noticed that the springs, 11 and 12, have closed, as have also 14 and 15. Now, when the dial is rotated in pulling the first digit, Fig. 69, several changes take place. The curved lever, 16, has lifted from spring 11, allowing the latter to break its connection with 12, thereby severing the connection from the vertical to the rotary line through the talking set.

Pin, 21, on lever, 20, has lifted lever, 22, so that its end, 25, no longer holds the ground spring, 7, away. This allows 7 to fall into contact with 8, grounding the local instrument ground wire which supplies the impulse springs, ringing button, and release springs. The two impulse springs are not in a position to be shown clearly. The release springs are at the right, 1 being the vertical, 2 the rotary, and 3 the local instrument ground.

*Continued from issue of October 10, 1908.

As the hook lever goes down, lug 26 presses a back projection on spring 1, bringing all three springs together momentarily. On the up-stroke the lug 26 presses spring 1 away from the rest and they make no contact. On hanging up, lug 24 presses the ground spring, 7, to the right and lets lever, 22, slip in to

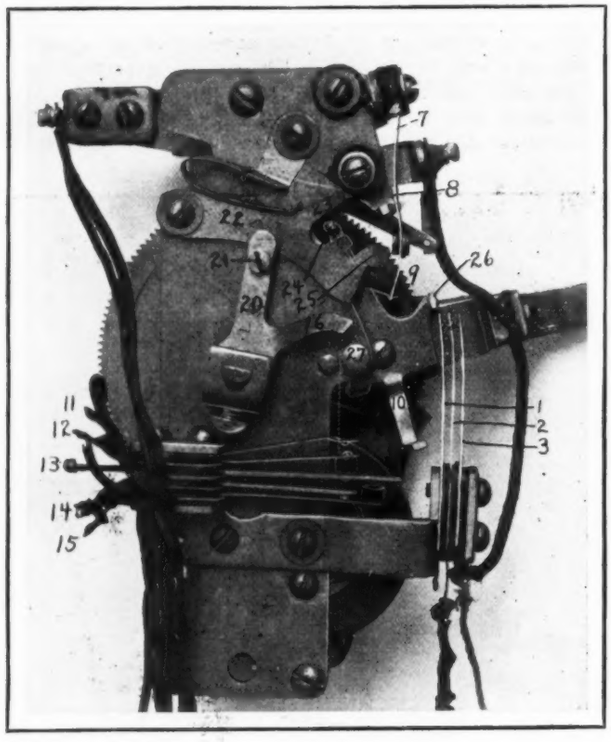


Fig. 69—Chicago Substation Sender, Showing Contacts as They Appear When First Digit is Pulled.

hold it there. Thus the apparatus is restored to the condition of Fig. 67.

Fig. 70 shows the substation wiring. The rotary line is the common return for the ringing and talking circuits in the instrument, both bell and receiver being permanently wired to it. With the receiver on the hook only the bell is across the line. With the hook up, the receiver and the secondary of the induction coil are put across the line in place of the bell. The local battery circuit for the transmitter is also closed by springs 14 and 15. During the rotation of the dial, lever 16 is lifted off spring 11, separating the vertical and rotary lines, while springs 4 and 6 are grounded according to the code. This code is simple and is the same for all digits, consisting of a series of impulses on the vertical line, followed by one impulse on the rotary line. Thus the necessity for the old reverser and star wheel was done away with. To ring, spring 18 of the ringing button is pressed, grounding the vertical line alone.

The first selector is shown in Fig. 71. At the left are the vertical and rotary lines coming from the substation. Each passes through a line relay, 30 ohms, a side-switch lever, and a 500-ohm retardation coil to negative battery, the positive terminal of which is grounded. The voltage was not far from 55 volts. The vertical relay controls the vertical magnet, or if the private magnet be energized, the release magnet. The rotary relay controls the meter magnet directly. The meter magnet acts on a mechanical message register, or counter, which is attached to the framework of the selector. The meter magnet carries a contact which is able to ground the private magnet, and thus operate it. Hence the rotary relay really controls both magnets simultaneously. The rotary magnet has a finger which touches the armature of the private magnet, so that the former will actuate the latter. The interruptions for the rotary magnet come from a set of springs operated by a motor which is kept running continuously.

The various members of the side-switch are numbered 1, 2, 3, 4, and 5, and are shown in their initial positions. In the machine they are built together mechanically, all moving together, and are controlled by the end of a lever, *S*, in the springs of the private magnet. A spring tends to move the side-switch lever, *S*, in the direction of the arrow, which would move all the members to the second and third positions. If the private magnet be energized, *S* slips past a tooth on the lower spring, but is caught by the tooth on the upper arm before it has moved far enough to affect the switch contacts. But when the private magnet is released, *S* slips to the left to the second tooth on the lower spring, thereby bringing each member to its second position.

This action of the auxiliary switching device, by means of which the act of releasing instead of pulling up the private magnet is made to operate the side-switch should be kept in mind, as it appears in all subsequent switches of the Strowger line, and need not be described again.

Fig. 72 presents the second selector with some new features There are two vertical and two rotary line relays, distinguished by their resistances, 30 and 500 ohms respectively. The 30 ohm relays are mounted together mechanically, each having a single spring. It requires the operation of both at the same time to bring them together, either relay alone not moving its spring far enough to touch the other. This is utilized to operate the release magnet.

To the 500-ohm line relays is given the work of directing the selecting mechanism. The 500-ohm vertical relay controls the vertical magnet. The 500-ohm rotary relay controls the private magnet. The circuit controlled by each relay passes through the back contact of the other relay, so that if both are pulled up at the same time, nothing will be affected.

The connector is shown in Fig. 73. Again the 30-ohm vertical and rotary relays do not perform their usual functions, the work being delegated to other relays, 500 ohms each, in series with them. They are called the vertical retard and rotary retard respectively. The vertical line has permanent connection to battery, but the rotary line, after passing through the rotary relay and rotary retard, goes through a contact on the busy relay to get battery. The vertical retard breaks the vertical line and grounds the vertical and rotary magnets. The rotary retard breaks the rotary line and grounds the side-switch magnet. The latter is exactly like the private magnet of previous switches, except that it is not in the feeder circuit to the private wiper, that function being here taken by the busy relay.

Side-switch lever No. 4 acts as a distributer of battery to the

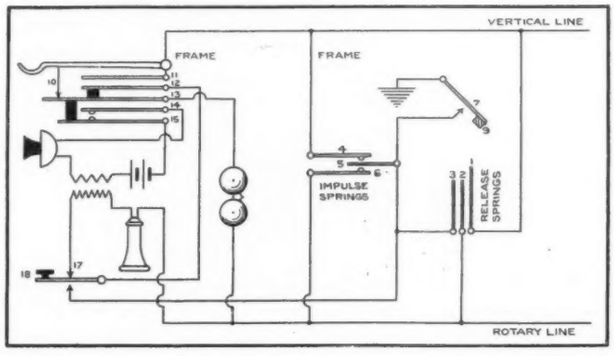


Fig. 70—Wiring of Automatic Substation Sets Installed at Chicago.

vertical and rotary magnets, and the ringing magnet. In addition to operating the side-switch, the side-switch magnet cuts battery off side-switch 4 when desired. The busy relay and busy release relay occupy a similar mechanical relation to that of the vertical and rotary relays in the second selector. If the

busy release relay is pulled up, spring *A* is moved over a little more than half way toward spring *B*. The busy relay must be energized at the same time to bring them together.

As explained before, the code of signals sent in by the substation sender consists of a series of impulses on the vertical line, followed by one on the rotary line. This is repeated for each digit. The first series is taken care of by the first selector, Fig. 71. The vertical relay grounds the vertical magnet, stepping the wiper shaft up to the desired level. The single impulse on the rotary line pulls up the rotary relay, which operates both meter magnet and private magnet. The latter brings the side-switch levers into their second or middle position. Levers 1 and 2 do not effect any change. Lever 3 connects the private wiper through the private magnet to battery, to act as feeler for non-busy trunk. Lever 4 cuts off the vertical magnet, while No. 5 connects the interrupter (ground) to the rotary magnet.

The first motion of the rotary magnet, while rotating the wipers into contact with the first trunk, pushes the armature of the private magnet against its polepiece. If the first trunk is busy, there will be a ground on its private contact, and the private magnet will be held up by the resulting current. But on striking the first non-busy trunk the private wiper finds no ground, the private magnet releases, snapping the side switch into its third position and cutting off current from the rotary magnet. Levers 1 and 2 connect the rotary and vertical lines through to the trunk lines leading to the second selector, while No. 3 disconnects the private magnet from the private wiper,

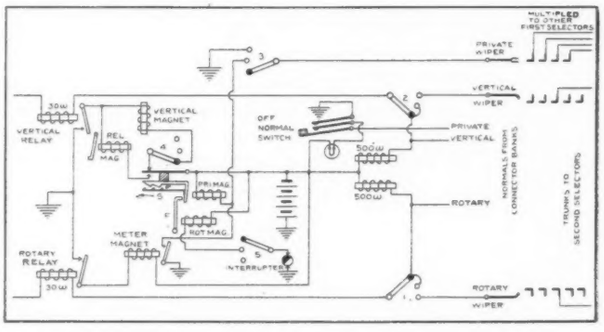


Fig. 71—Wiring of First Selector in Chicago Installation.

putting the latter to ground as a protection from other first selectors who might try to get in on the same trunk. The first upward motion of the wiper shaft closes the off normal switch, putting ground on the private normal so that incoming calls to this calling subscriber will get a busy signal.

The second series of impulses affects the second selector, Fig. 72. As before stated, the 30-ohm vertical and rotary relays have nothing to do with selection, being used only for release, and will be neglected while working through our call. On receiving the series of impulses over the vertical line, the 500-ohm vertical relay grounds the vertical magnet, stepping the wiper shaft up to the proper level. The single impulse on the rotary pulls up the 500-ohm rotary relay, causing the private magnet to step the side-switch over to the second position. At levers 1 and 2 no change is made. At 3 the private wiper is connected to the private magnet to serve as a feeler, as in the first selector. Lever 4 disconnects the vertical magnet, while 5 connects the interrupter to the rotary magnet. The test and selection of a non-busy trunk is identical with that of the first selector.

The connector, Fig. 73, takes the last two digits, tens and units. The vertical relay operates the busy release relay, but if its mate, the busy relay, is not energized, nothing will happen, as spring *A* can not touch *B*. While stepping up and around, the vertical relay can not affect the ringing magnet, though connected to it, since its circuit is open at the side-switch lever 4. On receiving the series of vertical impulses for the tens digit, the vertical retard grounds the vertical magnet a certain number of times, stepping the wiper shaft up. The following ground on the rotary energizes the rotary retard, causing the side-switch magnet to move the side-switch over to

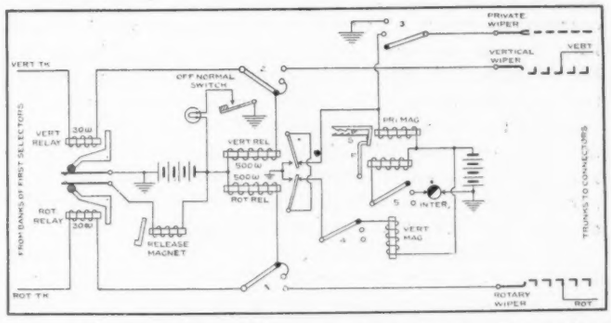


Fig. 72—Chicago Second Selector Wiring, Showing Two Relays For Each Side of Line.

the second position. At lever 1 this action connects the busy tone to the rotary line, but as the subscriber is not listening it has no practical effect. Lever 2 causes no change. Lever 3 connects the private wiper through the busy relay to battery, so that if the called line proves to be busy it will be safeguarded. Lever 4 shifts battery from the vertical to the rotary magnet.

The series of impulses for the units will operate the vertical retard, grounding the rotary magnet and rotating to the called line. The last impulse on the rotary line pulls up the rotary retard, causing the side-switch magnet to step the side-switch over to its last position. At levers 2 and 1 this action connects the vertical and rotary lines to the corresponding wipers which are resting on the called line. At 3 the private wiper is switched from the busy relay and connected to ground, to make the line busy against others. At 4 the battery is switched from the rotary to the ringing magnet. The pushing of the ringing button at the substation grounds the vertical line, pulling up both vertical relay and vertical retard. The latter does nothing. The vertical relay now grounds the ringing magnet, which projects alternating current out on the called line, cutting off the line behind it as is done in the manual ringing key.

If the called line is busy, the effect is as follows: Suppose we are at that point in selecting where the wipers, under the influence of the units vertical impulses, are rotating to find the called line. The side-switch is in the second or middle position, so that the battery is connected through the busy relay to the private wiper. The called line, being busy, will have

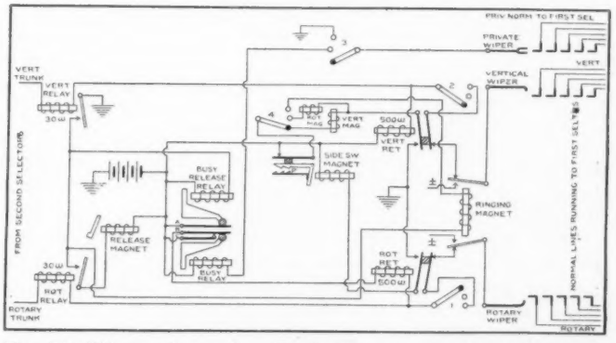


Fig. 73—Chicago Connector, Equipped with Vertical and Rotary Retard Relays.

ground on its private contact. When we arrive there our busy relay will be pulled up, cutting battery off the rotary line. The series of vertical impulses are followed by one on the rotary, but as the battery is cut off the latter this last impulse will not occur, as there is no complete circuit. Thus the side-switch is left in its middle position.

The calling subscriber, ignorant of this fact, pushes the ringing button, grounding the vertical line. The vertical relay is pulled up, operating the busy release relay. As the busy relay is energized by the ground on the private wiper, spring *A* will touch spring *B*, putting battery back on the rotary line; but this will not move anything. The vertical retard pulling up operates the rotary magnet, moving the wipers away from the busy line onto the next higher number. Then, while listening for the called subscriber to answer, the calling subscriber hears the busy tone through the middle contact of side-switch 1.

If the line to which the wipers have been rotated is also busy, the busy relay will still be energized, making the rotary line dead. This would prevent the release, were it not for the busy release relay. When the unsuccessful calling subscriber grounds both lines to release, the vertical relay pulls the busy release relay up, restoring battery to the rotary line. Since the latter is grounded at this instant at the substation, the rotary relay will pull up, operating the release magnet, which allows the wiper shaft to return to its initial position. The side-switch is also automatically reset by the release magnet.

The normal release is from a non-busy line with the side switch in the third position. Here it is only necessary for the vertical and rotary relays to pull up, the former to supply ground, the latter to connect that ground to the release magnet. At the same time the vertical retard pulls up and would ring the called line were it not that the rotary retard pulls up the side-switch magnet, cutting off battery from lever 4. In the first and second selectors the 30 ohm vertical and rotary relays alone are left in the line, and through them the release must take place. The mechanically mutual action of the 30 ohm vertical and rotary relays of the second selector has already been described. In the first selector, Fig. 71, the rotary relay operates the private magnet. The latter switches battery from the vertical magnet to the release magnet. As the 30 ohm vertical relay is also energized, the release magnet finds ground through its contact.

(*To be continued.*)

Subscriber Helps Telephone Service By Reading Paper at Farmers' Club Meeting.

While telephone men know how great an improvement in service can be effected by the intelligent co-operation of subscribers, the average telephone user is indifferent to this subject which so closely touches his own interests. The Union Telephone Company, of Alma, Mich., is fortunate in having a subscriber who not only appreciates that telephone users can help one another and the company, but knows just how to carry out a program of co-operation. Following are extracts from a paper presented at a meeting of the North Owosso Farmers' Club by Mrs. G. M. Getman:

"Good manners at the telephone are the same as elsewhere. Let the Golden Rule be first.

"It's natural to want our money's worth; but it is not good manners to *demand more* than our money's worth, as for instance, by using the telephone 45 minutes, or longer, for some simple conversation.

"First comes our duty to the operator. Let us not forget to be kind and considerate with these telephone girls, answering thousands of calls a day for all kinds of people. Their work is exacting, monotonous and nerve racking. Some women are very rude and impatient with them and, some men use profane language to them, over the telephone. (Would you believe it?)

"When asking for a number, speak each figure separate like five, one, three instead of five thirteen. When the called party answers, tell your name. He has no other way of knowing who you are unless he is familiar with your voice.

"Remember to ring off when through talking. It is a great help to the operator. Yes, and bear in mind not to talk longer than *two* or *three* minutes, five minutes being long enough for good manners. The other party may have some duty very important to attend to just then. If you talk longer than three minutes on the State line you will be charged for extra time.

"When the telephone rings answer by speaking your name, farm, residence, or store, thus: Mrs. (or Mr.) Jones, Jones' Farm, Jones' Residence or Jones' Grocery Store, whichever the case may be, eliminating all the 'Hellos' or 'who's this.'

"We can readily comprehend the advantage of this, for almost immediately the parties are ready for conversation. Talk *directly* into the transmitter, distinctly. Do not speak too loudly, nor too low; either is very annoying to the one listening.

"I visited the telephone office and my time was well spent. The manager was very willing to give all the information asked for, explaining in every detail how the telephone system of our city is operated. I was much impressed with the method of recording and paying attention to innumerable little things which go to make up the *whole*. There are twenty-four operators. The chief operator, her assistant, four of the State lines, a night operator, and the rest are on the local boards. One force works 8 hours, the other 8½ hours. Between 6:30 and 8:30 in the morning is their busiest time.

"The manager extended a very urgent invitation to the Farmers' Clubs to send a committee to visit them, in the operator's room, at the busiest time of the day or at any other time when convenient. I am sure by so doing we would work more in harmony with the telephone people.

"I asked about how many calls a day were received over the rural lines. The book was opened at no particular place. The total in one week was over 20,000 calls.

"The batteries are supposed to last 14 or 15 months. In some places in town they have lasted 2½ years, but on some rural lines the records show they were in only 8 months. Of course that was not on any of the N. O. Farmers' Club lines. I have no idea where it could have been. Bear in mind, please, the manager did not give this information in a fault finding way. Through the rural districts in some states telephones are not used as extensively as they are here. How they can do without them, is more than I can comprehend."

Mr. H. F. Clough, the district manager of the company, who was recently elected president of the Michigan Managers' Association, is to be congratulated on having people in his territory sufficiently interested in and alive to the possibilities of telephone service to consider the subject at their club meetings. Incidentally, such willingness to cooperate with the company shows most clearly that it is treating its subscribers well, and giving them a service which occasions no cause for dissatisfaction.

What Ears Are For.

In a Cleveland Kindergarten, says the *Michigan State Gazette*, the children were reciting their nature lesson in unison, responding to questions of the teacher.

"Now, children," began the latter, "I have fingers to—"

"Feel with!" shouted the class.

"And eyes to—"

"See with!" chorused the tots.

"And a nose to—"

"Smell with."

"And a mouth to—"

"Taste with."

"And ears to—"

"Telephone with," replied the class, triumphantly.

Telephone Combination: Would It Serve a Good Purpose?

By Gansey R. Johnston

There has been one period of telephone monopoly; we now have a condition of telephone competition; and by some it is sought to get away from the costs and divisions of competition by combination of the competing interests. I shall attempt to show some objections to the combinations proposed. The subject may be viewed from the standpoint of the public in rates and service and extension, of the owners and of the managers of existing plants in their present capacity and in their new relations with the combination, and of inventors and manufacturers. Combinations between co-operating telephone interests will not be taken into account in this writing.

If the interests of the employees were to be brought into the discussion, it is not thought the conclusions would be different. There have never been any general questions at issue between officers and employees of telephone companies. This is significant of the condition that the telephone business is almost altogether a local business.

Combinations of co-operating telephone companies have not generally been attempted on any considerable scale by those interests competing with the Bell companies. The different Bell companies are so far under one centralized control that they may be treated as a type of combination that has the benefits and drawbacks of combination without monopoly. The Independent companies are so far each in itself a local unit that they may exemplify the advantages and disadvantages of separate and local ownership and control.

The combinations with which I will deal are those that propose a centralized monopoly. There are some persons proposing local combinations with local monopoly, leaving those combinations under separate control, and leaving toll line companies competing for their long-distance traffic. Such a condition could hardly remain permanent. If there are sufficient reasons for local and district combinations of the kind, then the same reasons, it would seem, would lead to the amalgamation of these combinations.

First, as to the public. Its interest in competition that does truly compete is unquestioned. The public is prepared, with Macaulay, to "take it for granted that the effect of monopoly generally is to make articles scarce, to make them dear, and to make them bad." The public has had this experience with telephone monopoly, and has been willing to try competition in order to obtain a fair supply of good service at reasonable rates. Against such competition has been urged that it divides the users and increases the necessary investment—and little else.

Elsewhere I have treated these objections at length, and will treat them briefly here.

It is said telephone competition means half service or double cost. Historically it has meant multiplied service and diminished cost. .In the absence of competition real or threatened—the contemplating user found the public divided between the few on one system and the great mass on none. In its presence, he can find many on one, many on the other, and almost the sum of these two manies on the two. If he is satisfied with either division, his cost is certain to be very much less than formerly for a smaller number of maximum connections. If he wishes to reach the largest number, then his payments to both systems will be far short of double—perhaps no more than the single non-competitive payment. The combination at its necessarily higher price would yield him no connection with those that would decline to pay such price.

The argument of waste in duplication of plants may be disposed of by showing that the duplication in the competing plants is not great,—perhaps no greater than the wasteful duplication in a single plant in the present state of the art; that historically it is not to be supposed that like waste would have been avoided by a single system achieving a like development; that the future will utilize much that is now assumed to be waste; and that discoveries and inventions which competition promises to put into use will reduce costs below monopolistic inaction.

The public has gained through competitive telephone service the making of the service less scarce, less dear, and less poor. It has reason to expect through continuance of competition that it will be made still more extensive, still more available, relatively less expensive, and even better in quality. It is certain that the public would look with disfavor upon telephone consolidation.. For every one that it might benefit there are dozens whom it would disaffect.

There is a peculiarity in the relation of a telephone company to the public. The apparatus, with all of its improvements, is delicate and subject to certain imperfections and interruptions. The service comes into personal relationship with the user's purposes and emotions. An unexpected interruption or delay thus sets plans astray or affects strong feeling and arouses irritation. The immediate availability of a competing system offers an alternative for the occasion, and its existence acts generally as a safety valve. The occurrence of like interruptions on the two systems is a sign of their certainty. With all of its annoyances it seems easier to preserve public good-will toward either telephone company than toward a monopolized gas company. Whether the one truly tries harder than the other to deserve such good-will or not, the public is disposed to believe that it tries.

Public disaffection toward the combined telephone interests would make itself felt in many disturbing and expensive ways. Subscribers, property owners, roadmasters, county commissioners, city councils, state legislators, all have means of bringing pressure to bear upon an unpopular telephone company. Restrictions upon service or charges or dividends, extension of unlimited service limits, changes in plant construction, exceptional taxation, are some of the forms legislation might take in good faith—besides the possible popularization of legislative or administrative threats. Restrictions upon service or charge or dividends would likely work against the public interest by stopping expansion. Excessive expenditure requirements might easily force savings below the costs of good service, or add to the public charges.

Because of its great value and the lack of a substitute, no community can afford to see its telephone service seriously crippled. Competition has put the business on a close margin of profit. It is delicate, and there is temptation to stop its extension when a given state of a plant is all in use, and particularly to wait just one more period to see what copper prices may be, or what invention has more to offer. The city's water supply is a paramount necessity, but it is subject to few mechanical or managerial difficulties and is seldom interrupted. Gas and electric light can be substituted for. Street railway service does not meet many

cases of interruption that are not quickly removed, except the rush-hour condition, and then, as a rule, only time is lost. With the telephone the difficulties of maintaining good service are great. Much of its valuable traffic is so dependent upon the time element that it must pass promptly or become valueless. It certainly behooves the public and the telephone companies to keep on the best of terms. What the public needs most, namely, reasonably quick and certain service and reasonable advances with the demand and the progress of the art, are hardly to be forced by any known legal means. The best guarantee that can be found is competition for the public favor.

Second, to take the view of the owners. Telephone investments, generally speaking, are of two kinds: those that have come through the large financial centers to the Bell interest, and those which have been made locally in the local Independent interests. This last source of investment has brought large sums into the business and will continue year by year to bring more. Much of it comes from investors who have a fear of investments which they cannot watch, besides much from those who, though less fearful, yet refrain from purchase of speculative "trust" securities. The telephone business, as will be dwelt upon later, is constantly requiring new investments to keep pace with the public demands. The loss of any security market would be hard to overcome.

To accomplish any general consolidation would mean trading with the owners of local stocks and bonds, probably on a basis of artificial values. If such consolidation would follow the lines of many others, it would mean that the promoters would offer high prices (in figures on a paper) to the local owners in the expectation of selling to the public at high prices (in dollars). Unless there should be important advantages in telephone combinations, somewhere in the process loss would follow.

The fear mentioned is not unfounded. There is the risk of bad management. That this is not fanciful may be judged from the circumstances that the Bell company in the past has suffered from bad management—perhaps not in its first easy money-making period, but certainly in the period just preceding and following the patent expiration. Blindness to the public need, the view of the telephone as a luxury, and the high monopoly prices, gave inexperienced investors the opportunity to get in and create new values for themselves and the public from the Bell company's neglected opportunities.

In another consideration, I am following the President of the American Telephone & Telegraph Company in mentioning, but with the contrary implication, the danger of dishonest speculation. It seems to me that this is less likely to proceed from and work disaster to individual local companies than a central organization.

Any reason for the fear of investment in monopolistic combinations arises from the likelihood of new competition. From the expressions of both Bell and Independent telephone companies, it is easy to believe that a restoration of monopoly would mean a new outbreak of competition. The Bell companies have always admitted that a new telephone company starting up in a community, with new equipment, short lines, a small subscription list, the lessons without expense of the older company's experiments and mistakes, and perhaps a willingness to speculate on ultimate sale, can make lower rates than the older company; but have argued that such advantages are not permanent and ultimately mean loss to the community. The Independent companies have argued that time has proved their own contention that the telephone field is large enough for competing interests to exist permanently. There seems to be no escape from the conclusion that a telephone monopoly coming to exist in any city that has once had the benefits of competition would soon find itself opposed by a new competitor—either through speculators seeking temporary profits or a forced purchase, or through telephone constructors and operators proceeding on their experience and faith in the public value of competition. New companies would be particularly encouraged by the inevitable adjustment of rates by the combination. Such adjustment would reduce the payments of some, but would increase the rates for at least six or eight times as many.

Combinations are often in a reaction of feeling following excessive conflicts. Appeals for harmony and co-operation fall on listening ears. The continuation of fraternity, however, is uncertain at best. Those who have built up a business through individuality are disposed to find routine and discipline irksome. A good many attempted or completed combinations have fallen apart from personal causes. The "politics" of the promotion may not rest well with everybody. Some may get into the organization who are willing to advance their personal interests at the general expense, or who will count on profit through the breaking of agreements that others keep.

If the local interests retain any individual powers, they may contend, wisely and in good faith, against general policies not adapted to their needs. If sufficient funds are lacking for every local plant, these plants may compete among themselves for their share of the available funds to a detrimental extent. The possible necessity of utilizing receipts or funds to which a strong interest might feel itself entitled, for the protection of a weak interest, not on its merits, but to preserve the combination, could easily make for antagonism.

Existing owners have to consider not only their willingness or unwillingness to enter a combination on the latter's best terms; but also, it may be, their inability to decline its chosen terms after it gains a strength sufficient to overwhelm a single interest. They may therefore view the beginning of combination as a danger.

Third. The management of a local telephone plant is a subject of sufficient importance to justify much space in its treatment. There is something to be said on either side of the question whether the best management can be expected through separate local organizations or one general organization.* The management of a telephone plant may be divided into two general classes: business and technical. The business management comprises comparatively few problems dealing with heavy fluctuations of income and the necessity of conforming expenditures thereto. The greatest need in telephone management is the capacity to build up the permanent subscription list and to maintain relations of good-will with the telephone public, besides so planning and watching the routine as to make good service with no wasteful expenditures. The central organization may have some advantages in finding and training the routine worker, but in finding that manager who will build up the local business, it is at a disadvantage in comparison with the local owners of the property, provided such owners are themselves in good standing with the community.

On the technical side the central organization may be said to have better opportunity to find and to train technical workers. This advantage is lessened when the technical capacity is to be combined with initiative or managerial ability. In the telephone business, the Bell companies have had nothing like a monopoly of the best technical men.

In generalizing regarding the subordinate officers of large and small organizations respectively, an allowance must be made for many exceptions, but certain approximations to rules can be found. The large organization can best afford to pay for exceptional or commanding talent and for those of pe-

*The possibility of governmental ownership or operation does not enter into this discussion. There is a desire in some quarters for governmental regulation of some sort; but it does not appear likely that it will take so strict a turn anywhere as to make it desirable to bring the points of governmental selection and control of managers into our comparison.

culiar abilities, and has better opportunity to employ those abilities; and for those of good but not exceptional grades of ability can offer better opportunities of education and of continued employment with occasional promotion. Those of this latter grade with a large organization will probably receive lower pay and smaller promotion than they may get from separate organizations competing for their services. There is certain attractiveness about service in a large organization that permits it to keep the salaries down and the promotion slow, save for the exceptional persons. Simply the accessibility of the large organization brings many recruits to its employing officers. A schedule of salaries and of lines of promotion, while not completely followed, must yet be substantially observed.

The specialization of work which at times brings about some increase of efficiency, may at other times destroy efficiency by lessening the worker's adaptability. Accordingly, the large organization has the advantage that give routine training and the disadvantages that come from lack of adaptability to variations in conditions.

The large organization, with its more or less systematic and expensive training, is not permitted to reap for itself the benefits of that training, as it will be drawn upon by outside organizations that can offer more pay to its students; while its own gradation of forces and standardization of methods stand in the way of its acceptance of men trained by others. The advantages of the large organization appear to diminish as the number of its employees in a given class increases, because then the methods of dealing with them must become more of routine and less of personal discrimination. It must keep an expensive watch over employees as a guard against negligence, waste, and dishonesty.

In dealing with engineering problems that cannot be generalized, the large organization with its few exceptional engineers probably first reaches the proper solution, but after the problem is solved it is likely to become public property and available to students on the smaller plants. In dealing with the small engineering problems, the large organization puts itself at a disadvantage in checking and rechecking the work of those on the ground.

The local organization, which has much to gain from the public favor, has the large advantage of personal acquaintance. The owners and managers of individual organizations have an element of pride and personal interest in their work which large organizations can by no means instill in theirs. These frequently seek substitutes for this local pride by more or less expensive methods. A small measure of success in this direction is an important and pleasing achievement.

The larger companies, in dealing with a growing and changing technical business, have certain advantages in centralizing their experiments in laboratories in charge of specially chosen expermentors. These advantages, however, are not at all exclusive.

The entire body of responsible and promotable employees may find themselves subjected to the control of unfair or incapable general officers or placed in discouraging relations with nepotic superiors or competitors for promotion. While the occasional dissatisfied manager can usually find acceptable employment outside of his particular organization, a large number desiring a change at one time can not.

Hence it would appear that the separate telephone organizations offer their managers and technical men a closer personal relationship to the business, with consequent greater pride and interest therein, and an average higher pay and better prospects as the business grows. Being in closer touch with local needs, they are more apt to respond to those needs and thus furnish a more desirable service. They can better deal with their own subordinates on a personal basis. The technical men have equal access to all that may be published on technical matters, and perhaps even better exchange of information with others in the same business. They tend to advance the business by their freedom to experiment, as do the employees of the larger company by following their routine and standardization.

I cannot point to any combination that has taken into a large organization any such number of independent managers as would a general consolidation of telephone properties. The large combinations now existing have been built up gradually with salaried subordinates or in their formation have displaced or taken over in any given time comparatively few individually responsible managers capable of competition.

Fourth. Inventors may be within or without the monopolistic organization. The interests in charge of special experimental laboratories may be permitted to stand in the way of the encouragement of invention among employees in general. It is a common complaint that a subordinate who conceives a valuable idea which reaches such centers is not entrusted with working out its ramifications, and finds credit for these, if not for the origination assigned to others. Those outside the organization not only have particular difficulty in experimenting, but also share with those within the difficulties of selling to a buyer that controls the market. The interests of the larger organization, particularly if it is not pressed by competition, does not always lie in the direction of putting improvements into use. Furthermore, the judgment of such an organization as to what is a valuable invention is not unlikely to be led astray by precedent.

There are two features of the telephone service that impress themselves more than all others upon any careful observer. One is the tremendous economic value of the telephone—far beyond the competitive price to the community. The other is the prospect for still greater values and still lower costs which may be expected from further invention. For those who protest (against what appears to be the contrary fact) that the costs of telephone competition are unduly high, there is the answer that present telephone service values are so high and prospective values so much higher that the public has an exceptional opportunity to spend small sums in reasonable expectation of large future gains.

Fifth. In the supplying of apparatus for the Bell telephone operating companies there has been a monopoly manufactory. No doubt the manufacturing company profited largely, but it is hardly overdrawn to say that the operating companies lost correspondingly. The large business of supplying telephone service was almost at the mercy of the small business of supplying telephones. Those who are interested in furnishing or utilizing the service have such an interest in the obtaining of good instruments at fair prices that they are not at all likely to permit the monopoly condition to be restored.

The manufacturers whose market is now with the Independent telephone companies have done a great deal toward the advance of the art. They control many valuable patents. Possibly they could be forced into combination by a combination of the telephone service companies—to the profit of some perhaps, but to the general detriment of the companies and the public. A combination among themselves would only mean an invitation for new competitors.

(To be continued.)

Early Construction of Honolulu Independent System Promised.

Reports from Honolulu, H. I., indicate that, after several false starts, that city may have an Independent telephone system within a short time. The Hawaiian Telephone & Telegraph Company states that it will commence construction under the charter secured July 1, 1907, about the first of January.

The officers of the company are C. J. Hutchins, president; J. A. Balch, vice-president; A. N. Campbell, secretary; E. M. Campbell, treasurer; William Campbell, auditor.

Economical Development of Toll Territory*

By Frank F. Fowle

There are several useful ratios expressing the relation between the total traffic for a month, and the traffic on particular days of the week; it is necessary to obtain such ratios for use in traffic calculations. The following ratios have been computed from the daily total outward traffic from a toll office, for a period of eight months, and are therefore reliable averages.

Average ratio of daily traffic to monthly traffic, for Monday to Friday, inclusive	.0370
Average ratio of daily traffic to monthly traffic, for Saturday only	.0340
Average ratio of daily traffic to monthly traffic, for Sunday only	.0101
Average ratio of maximum day's traffic to monthly traffic	.0410

It may seem to many a curious result that a formula for predetermining the traffic could be developed without taking into account the ratio of telephones to population, or percentage of development. It is well known that toll traffic increases as the development increases, and it would be would have necessarily to be a factor in any formula such as has been presented above. On the other hand, toll traffic increases with the growth of population, which fact is contained in the formula; that is, a 10% increase in the population of each of two zones will be attended by a 21% increase in toll traffic between them, other things remaining constant. There is undoubtedly a variation in the value of the constant K, as it would be deduced separately from the traffic in each of several large territories containing each the same total population, but differing materially in percentage development. Fifteen years ago the annual toll receipts per head of population were slightly below $0.25, and at that time the development of the United States as a whole was only a fraction of its present development; the corresponding value of K would probably be 40 per cent of the value deduced above. It will be advisable, therefore, to check the value of K every few years as the development increases and it will be reasonable to expect K to increase.

The effect upon the traffic of the amount of the unit

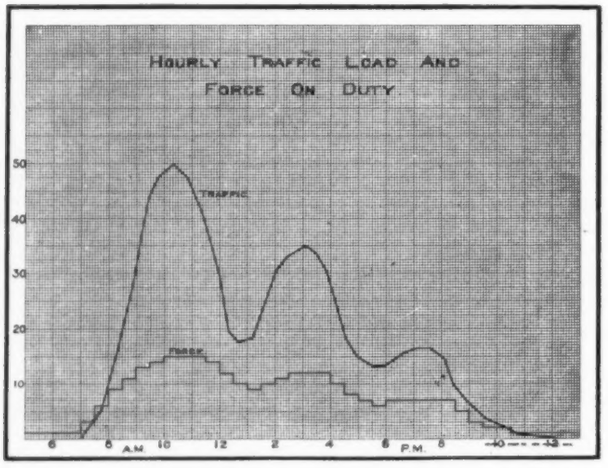


Fig. 4.—Characteristic Load Curve Under Fixed Schedule of Rates.

rate,— the minute-mile rate,—is a subject upon which there is only meagre data, aside from the general principle that as rates diminish traffic increases and vice versa. It is very difficult to obtain comprehensive data because it is not feasible to experiment with different rates and alter the schedule frequently, as the general public will not, of course, tolerate such a proceeding. Comparisons may be

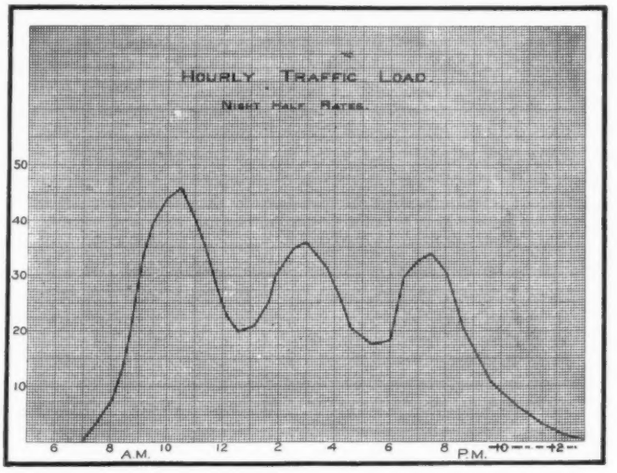


Fig. 5.—Typical Week Day Load Curve Under a Double Rate System.

made between rate schedules in different territories, but in such comparisons there is always the important element of dissimilarity in local conditions which leaves a degree of uncertainty in the deductions. The elimination of night half-rates furnished an opportunity for observation of the effect of a rate change upon traffic; in general it may be said that the result is a reduction of the night traffic, not constant in amount as regards different sections of territory, and not exceeding 50 per cent of the night traffic as a whole. This particular instance may be summed up in the statement that doubling the rate reduces the traffic by an amount slightly less than half,—the net change in revenue being a small increase. If the converse of this proposition is true, it follows that halving the rate will not quite double the traffic; or expressing the principle in more general form, a given percentage change in rates will produce an opposite change in traffic, whose percentage is slightly less.

This is not urged as necessarily true in a universal sense, because there are not enough data to warrant it, but it may be regarded as upsetting the theory sometimes advanced that halving the rates will double the traffic or that doubling the rates will halve the traffic. A more positive conclusion the author is unable to advance at this time. The topic is an important one, because rate changes produce traffic changes, and the resultant effect will be to overload or underload the plant unless advance provision is made in anticipation of the change. Therefore it should receive the attention of those who have had experience with such changes, so that the law which expresses the results of rate changes, if there is one, may be deduced and made known.

CIRCUIT LOADS AND OPERATOR LOADS.

Those companies which charge for toll service on the basis of one rate schedule for all hours of the day have no means of controlling the variation of the public demand from hour to hour of the day. Facilities must be provided to handle the traffic in the maximum period, or during the peak load; at other times the facilities will be underloaded and the only

*Paper presented at the Convention of the International Independent Telephone Association. Continued from issue of December 19, 1908.

economy possible is a reduction at such times of the operating force. From the standpoint of economy in operation there are two things to be sought for: first, the highest feasible circuit loads during the peak load period, and, second, an arrangement of the hours of the operating force so that the force corresponds at all times to the load. The load curves are prepared from traffic data which show the number of calls handled each hour or half-hour, throughout a day of 24 hours; a half-hour period is to be preferred on account of rather

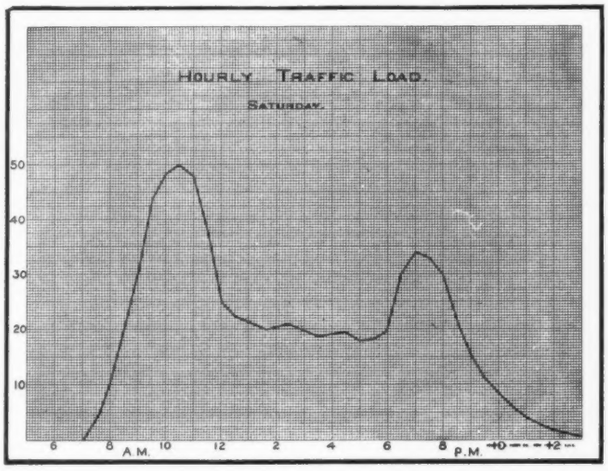


Fig. 6.—Typical Saturday Load Curve with Night Half Rates.

rapid changes in the load at several periods of the day. A typical load curve, under a fixed schedule of rates, is represented in Fig. 4; the characteristic of this type of load curve is a double peak, the one in the forenoon corresponding to the maximum traffic, and a small evening load after 6 P. M. The load curves of all offices are not precisely identical, but will vary among themselves as to the relative prominence of the morning and afternoon peaks and the evening load; the curves for one office prepared at different times of the year will usually show slight variations. Fig. 4 shows the characteristic load on any week day from Monday to Friday inclusive; on Saturday the afternoon peak is missing and on Sunday there is no pronounced peak whatever.

The load curves under a graded rate system are materially different from Fig. 4. The following illustrations show characteristic loads under a night half-rate schedule operative between 6 P. M. and 6 A. M. Fig. 5 shows a typical load curve for any week day from Monday to Friday inclusive; the prominent characteristic is a triple peak, one peak in the forenoon which is the maximum, one in the afternoon and one in the evening. The evening peak is not materially different from the afternoon peak, except that it is usually slightly less in magnitude and shorter in duration than the latter; in some instances, however, the evening peak may exceed the afternoon peak. Fig. 6 shows a typical Saturday load curve and Fig. 7 a typical Sunday load curve, under a night half-rate schedule. There is one characteristic quantity or value in such load curves by which they may be compared with one another, and from which some idea may be formed as to the distribution of the load; this quantity is the ratio of the average half-hourly load for an entire day to the maximum load for that day, and is termed the load factor. A large load factor corresponds to an evenly distributed load with no very prominent peaks; a small load factor corresponds to an unevenly distributed load with at least one prominent peak. A large load factor is most to be desired, because the plant facilities which it is necessary to provide to carry the peak load will, at other times, be idle only to a slight extent; the degree of idleness, at periods other than the peak load period, will diminish as the load factor increases, and vice versa.

It is pertinent to emphasize at this point the effect upon the load factor of graduating the rate schedule during the hours of the day in proportion to the public demand for service. While it is recognized that recent tendencies in some cases have been toward a fixed rate schedule throughout the day, rather than a graded schedule, it is believed that the real motive has been a desire to increase revenues without raising the day rates. And it is further believed that such a plan is not in the end the most economical one to the telephone companies or the most satisfactory to the public. In one instance a comparison of conditions before and after an abolition of a night half-rate revealed a decrease of the load factor from 29.5% to 27.3%, and an increase in the morning peak load of 9.1%; the absolute decrease in the load factor amounts to 7.5%. The resulting increase in total revenue, other things remaining constant, will be roughly 10%, and in case no additional facilities are provided to take care of the increased peak load, the net earnings will be increased correspondingly as regards absolute amount, and in a much greater ratio on a percentage basis. The result on the service will be to increase the subscribers' average wait from giving a call to the establishment of connection, during the peak load period and for a short period thereafter until the delayed business has been cleared up. In the event that sufficient additions are made to the office plant and the pole line plant to carry the extra peak of the load without impairing the quality of service previously given, and in the event also that the operating force is adequately increased during the peak load period, the increased revenue will be largely absorbed by increased expenses and fixed charges. The ultimate economy of the plan is therefore in question, and even though a small net economy can be shown when the speed of service is not impaired by the change, the whole tendency is to throttle development instead of stimulating it, and the plan is believed, therefore, to be economically wrong.

The change from a fixed rate schedule to a graded rate schedule, with day and night rates, will logically involve a slight increase of the day rate as well as a substantial reduction of the night rate from the previous fixed rate, because a part of the day traffic will be transferred to the night period in order to take advantage of the lower rate. Experience, moreover, does not indicate that halving the night rate will

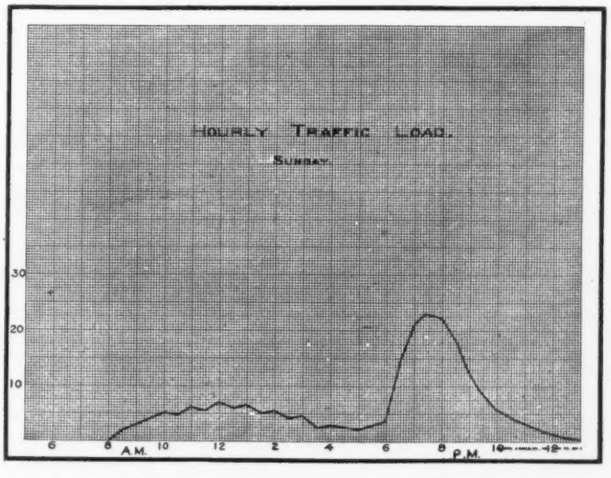


Fig. 7.—Typical Sunday Load Curve with Night Half Rates.

fully double the night traffic, and the immediate effect upon the total revenue will be a loss, unless compensated for by a small increase in day rates. On the presumption that there were adequate plant facilities to give reasonably good service before the rate change, the drop in the peak load which will result from the change will leave a small margin of spare

facilities, and postpone for a time the necessity of adding to the plant. After the traffic has grown up to the facilities once more, the acompanying increase of revenue will increase the net profits, and it may then be possible to scale down all the rates uniformly on this account. There will be further advantages under a triple schedule of rates as compared with a double, or day and night schedule as just described. This has never, so far as known, been actually tried, but it is submitted as a logical and rational plan for securing a maximum toll development and indirectly aiding local development as well. As an illustration consider the hours from 9 a. m. to 4 p. m. as the high rate period, the hours from 4 p. m. to 8 p. m. and from 6 a. m. to 9 a. m. as the medium rate period and the hours from 8 p. m. to 6 a. m. as the low rate period; possibly the medium rate might be introduced also between the hours of 12 noon and 2 p. m. One of the chief arguments which will be urged against such a plan is the increased auditing expense, caused by the necessity for listing separately on the check ledgers the business in each rate period. When it is shown that the auditing expense is but a small percentage of the total expense of conducting the business, and when it is granted that the auditing expense may increase even as much as 10% to 15%, it is obvious that the resulting net increase in total expense must be very small. The saving in auditing expense which accompanied an abolishment of night half-rates and the substitution of a single rate schedule in place of a double schedule did not, in one instance, equal 10% of the auditing expense. It is believed that the general principle of grading the toll rate will secure a maximum toll development, improve the load factor, simplify the matter of adjusting the operating force to the traffic load and produce the most uniform grade of service which it is possible to give.

(To be continued.)

Independent Telephony in New Mexico.

The Silver City, El Paso & Southwest Telephone Company was organized in April, 1907, by the Independent telephone men of southern New Mexico and El Paso, Texas, for the purpose of connecting by long distance the exchanges at El Paso, Texas, Las Cruces, Deming and Silver City, N. M. Their plans also contemplate extending to Elephant Butte and Hillsboro in the near future, thus bringing the government into direct communication with El Paso in its vast work at the Elephant Butte dam.

The city of El Paso will also be connected directly with the county seats of each of the four neighboring counties of New Mexico, i. e., Dona Ana, Luna, Grant and Sierra, with each of which the merchants of El Paso have large business interests. Besides this, it is proposed to install a metallic copper circuit to Deming and Silver City for the improvement of the service to those points, thus giving two circuits from El Paso to Silver City and three to Las Cruces to take care of the heavy and growing toll business and the farmers, etc., who are clamoring for service, but who cannot at present be accommodated owing to limited facilities.

The company is at present operating about 234 miles of line, and its policy is, and will be, to keep pace with the growth of this portion of the Rio Grande valley and all of the territory tributary to El Paso. That it is vitally interested in the continued growth and prosperity of this section is best evidenced by the names of its stockholders and owners, among whom are William D. Murray and Thomas L. Lowe, of Silver City; C. B. Bosworth, of Deming; W. E. Baker, of Las Cruces; Charles E. Miller, of Anthony; J. H. Morgan and Henry Lepp, of El Paso. These men are well known, and besides being interested in the telephone business, are connected with other enterprises which will be directly affected by the continued prosperity of southern New Mexico and Texas.

The lines of the Silver City, El Paso & Southwest Telephone Company connect at El Paso with the automatic exchange of the Southern Independent Telephone Company. This company has an up-to-date, all-cable plant, and is furnishing a service, the popularity of which is attested by the telephone users. Within the past month it has started the construction of improvements which will cost in the neighborhood of $100,000 and, when completed, will make their plant one of the finest in the west. Among these improvements may be mentioned the construction of a line from El Paso to Ysleta, San Elizario and Clint, Texas, which will complete the chain of commnuication along the Rio Grande valley from Elephant Butte to Clint, and connect the lower valley with the outside world. This company points to the fact that it has been of great benefit to El Paso in that it has made possible a first class telephone service in the city at an extremely low rate and has been one of the factors in the development of the long distance telephone service which connects El Paso with the surrounding territory, Henry Lepp, the president, and J. H. Morgan, the manager, being directors of the long distance company.

The Mesilla Valley Telephone Company is the Las Cruces connection. It has in operation an exchange in Las Cruces with local lines to Mesilla, Mesilla Park, Dona Ana, Organ and Selden. W. E. Baker, the president and manager of this company, was the original promoter of the enterprise, and is now the principal owner, and is a stockholder in the long distance company.

At Deming the lines connect with the exchange of the Luna County Telephone & Improvement Company, operating a system of some 230 subscribers and about 50 miles of rural lines in the Mimbres valley. The company is strictly a local concern, having been organized by C. B. Bosworth, its president, and the stock is held by the business men of Deming. J. J. Jeffers is the local manager.

The Grant County Telephone Company furnishes a connection at Silver City, and gives service to the surrounding mining camps of Burro Mountains, Pinos Altos, Santa Rita, Hanover, Fierro and Central, as well as the government sanatorium at Fort Bayard, and a line is now under contemplation to connect Silver City with the mining districts of Mongollon and Cooney. William D. Murray was one of the originators of this company and is its president. He is also president of the Silver City National bank, the Silver valley water works and the long distance company, and is interested in a number of other enterprises in that locality. This company operates a first-class plant and its stock is also held locally. Roy H. Johnson is manager for the company.

Regular Plan for Gathering News Over Country Telephone Lines.

Local news is gathered from residents of the country surrounding Westmoreland, Kans., by the Westmoreland *Recorder*, in accordance with a definite plan. Subscribers on each line know that, at a certain hour of a specified day in each week, a general call will be sent over their line. All are expected to respond, at once, as the *Recorder* says that "very often a party who thinks of nothing has an item called to mind when listening to others. In an item announcing the programme for calling the various lines the *Recorder* says: "The general ring to be given for all parties on a line is eight rings. When that alarm sounds we want the woman to drop her iron, lay the baby in the cradle, shake the dishwater from her hands, leave the bed half made or tie a shoestring around her hair and answer to the call. The men if they are about the house are also requested to give equal attention to the call with the women. The *Recorder* is no respecter of persons."

Economy in Exchange Management*

By G. E. Bickley

This subject, as I understand the wish of the program committee, is to be handled under the head of "Economy in the Making, Maintaining and Operating of the Physical Property, Aside from the Purely Business Department of the Plant," and will be so discussed.

Economy in these lines should be based on economy in building a plant, economy in maintaining same, and economy in its operation.

To economize in construction, three points should be considered: Stability of construction, durability of apparatus, accessibility of distribution.

Stability of Construction: Stable construction makes for low maintenance and satisfactory operation. Its existence is by heavy pole lines, sufficient guy work intelligently placed, and as heavy a percentage of cable distribution as the operating conditions will permit. Especially does cable distribution make for stability of the plant. In the last few weeks the writer has installed into service again cable which was originally installed in the year 1895, in the old Cedar Valley plant at Waterloo, and which did service for years. The pole line which carried it is decayed and the messenger rusted away. Some of the men who created it have died, but the cable itself is still 95 per cent as good as the day it was purchased, and is actually worth more to-day than new cable of the same capacity.

I have also seen installed underground ten thousand dollars worth of second-hand cable, fourteen years old, which had been in service for years on aerial lines, and which at the time of underground installation was worth more per foot than new cable of the same capacity. These matters speak for themselves, as this same ten thousand dollars in aerial wires would have not only been entirely dissipated, but a heavy junking expense would have been incurred.

Durability of Apparatus: Durability of apparatus depends in a great measure upon the simplicity and permanency of design, and its uniformity of appearance. For all apparatus designed for the same purpose, certain parts have their own functions to perform, and usually about the same number of movements are made to reach the desired end. The apparatus whose moving parts are plainly and carefully finished, and whose action is positive and free from all unnecessary complications, lasts the longest and costs least to maintain.

With the same general line of apparatus, if the backboards in telephone instruments vary in design, it will be found that this will make an additional drain upon the maintenance of the plant at a later date, for if we are to keep the styles changing in the appearance of telephone boxes as we do with men's and women's clothes, it will be found that much profit will be eaten up unnecessarily. It would, therefore, be logical to adopt some plan to secure uniformity of appearance for instruments, and maintain them as closely as possible, even though it is necessary to buy instruments of different makes on account of the necessities of business agreements.

Accessibility of Distribution: The completeness with which the lines of a telephone company cover the field in which it is operating determines the actual cost per unit of installation for all additional telephones, and for all moves and changes; thereby directly affecting the maintenance of a heavy or light installation force as the case may be. It therefore has a very heavy influence on the building up of the company's list of patrons, for the very obvious reason that a telephone company never solicits business in those parts of the city wherein it is expensive to take on telephones, and the greater the extent of the field which is not covered, the greater the amount of business which will be lost to the company on account of the fact that it is not "going after" and getting it.

Economy in Maintenance: Economy in maintenance is looked upon in two or more different ways by various managers. One believes in keeping as small a force as will be able to keep up the actual current repairs as patrons make complaints, while others try to anticipate many of the complaints by using a slightly larger force, and making inspections of apparatus at stated intervals.

This much is true, that real economy in maintenance consists in keeping the plant at the highest earning power at a minimum cost, which purpose can be accomplished by sufficient help to keep current repairs well in hand, and so far as possible to replace wrecked material, either before the subscriber is aware of the trouble, or immediately upon his making the complaint, and to see that inferior material is not kept in use at a serious expense of labor and loss of prestige in our patrons' minds. For example, we will say a subscriber's unit costs $60.00 on an average, and he has a bad transmitter which costs two per cent of the total investment. This bad transmitter can entirely destroy your patron's good opinion of the company and will affect the good opinion of dozens of others to whom he talks, and if neglected long enough will actually destroy the earning capacity of $60.00 worth of property for the lack of a two per cent expenditure in the way of renewals. The same general theory will hold good as regards receivers and especially cords and batteries.

In connection with the maintenance of the plant there is one thing which can be absolutely relied upon, and that is trouble will always be with you. Trouble is the spectre which always has and always will haunt the telephone man, and there are just two ways in which it exists in a plant. In one plant it is being chased and caught and disfigured by the trouble man, and in others he is doing the chasing, and like a shadowy Nemesis he dogs the footsteps of the manager, harassing him day and night.

To some managers this condition looks like economy for a time, but it is a safe hazard that a few years of it will convince them that instead of being economy it is something that can be spelled with much fewer letters, and so realistic will the condition become that his very language will be likely to acquire a sulphurous tinge.

Economy in Operation: Insist upon having a body of operators who know their business, who are polite and accurate and accommodating, and to which force there is sufficient elasticity to handle a sudden increase, or excursion, if you will, of traffic. The railroad man knows about his excursions in advance and prepares to handle them. The telephone man knows that the fire whistle, the heavy rain, the bad storm, and anything which makes other highways hard to travel will throw a heavy increase on the traffic load of his company, and there is no time at which the patron so appreciates accuracy, politeness and speed as at such times when his actual need is greatest.

Economy along the lines discussed in each of these matters should make an ideal plant, which in turn should make a satisfied patronage, which of itself should be the foundation for an economical handling of collections and accounts.

*Abstract of a paper presented at the convention of the Northeastern Iowa Independent Telephone Association.

The Telephone in the Courts

Conducted by A. H. McMillan

Construction of Toll Line Contract.

We would like your opinion on trouble, we, as sublicensee to the Bell, are having with the Bell company. The contract we have with them reads: "There shall be no other charge than the regular toll charge." At the time of contracting, no mention was made of any exchange charges, meaning thereby a charge for messages coming from Bell lines and remaining within our exchanges. As this particular class of business amounts to considerable, we decided that we were entitled to some compensation for making the switch and allowing them the use of our exchange. We asked them to pay us three cents per message, the same as they charge us and other sub-licensee companies for the use of their exchanges. They absolutely refused. We then refused to make the switch for them unless they paid us five cents per message. They now say the practice must stop and threaten us with disconnection. They have, after discussing the disagreement, gone a step further and say that also all toll line charges must cease. That means toll charges made by us in villages where they have a public station. To illustrate, we have an exchange at U—four miles north is the village of V—where they have a public station. Our lines run in there also from the U-exchange. They demand that when they send a call into our U-exchange for any one of our subscribers living at V—four miles north, where our toll charge is ten cents, we are to give them free talk for the simple reason only that they have a line there and a public station. The rate commission has not jurisdiction in the matter, but suggest we try it out in the court. That would be good and well, but in the meantime, they will disconnect us, and though we come out winner in court, it will be optional for them to take us on again or not. We realize that under the existing contract, our position on the exchange charge is a weak one, but do claim that we are justly entitled to the ten cent toll charge.

Under your contract the only charge that you can make is the regular toll charge. This prohibits your exchange charge, but upholds the ten-cent toll charge. If you wish to try it out in court, we would suggest that you do so by injunction proceedings, having them restrained from disconnecting your line until the matter is decided.

Payment of Switching Fees by Unincorporated Company.

Our company is not incorporated, although it does business as a company. We connect with a switchboard owned by a large toll line company, and pay for our switching service by fees. Some of the stockholders and renters do not pay these fees promptly, and the toll company asked us (as a company) to become holden for these switch fees. Are we compelled to do this or not?

Whether or not your company is responsibe for switching fees depends upon the contract between your company and the company owning the switchboard. If your company made arrangements for the switching service and agreed upon the rates, you are holden as a company. If your stockholders and renters made the agreement directly with the toll line company, then they are individually responsible and you, as a company, are not. If the agreement with the toll line company was made by you as a company, and it was expressly agreed that the stockholders and renters should pay direct to the toll line company whatever fees they individually incurred, then you, as a company, are not responsible. If your company made the arrangement with the company owning the switchboard, and nothing was said as to whether fees should be paid by your company or directly by your stockholders and renters, then, in the opinion of the Editor, your company is liable for such fees.

Distance Between Electric Light and Telephone Wires.

A lineman, in adjusting wires to the cross-arms on a telephone pole below and near the wires of an electric light and power company came in contact with them and was burned and injured. He brought suit against both the telephone company and the electric light company and recovered a judgment. The lineman had climbed to the upper cross-arms of the pole he was working on, bestrode one of them, placed his feet on one of the lower arms, leaned over, head down, tied the wires and in straightening himself to go down, came in contact with one or more of the power wires, and thus sustained his injury. One of the power wires was directly over, and only twenty-seven inches from the top of the telephone pole, and only fifty-nine inches from the lower cross-arm on which the plaintiff stood. He was sixty-seven inches tall. The case was appealed to the Supreme Court of Vermont, and the judgment given the lineman reversed on account of errors in the charge of the circuit judge.

On the subject of distance between wires, the court held that it was the telephone company's duty to see that the lighting wires were a safe distance from its own poles so as to prevent injuries to its employees.

Drown vs. New England Telephone and Telegraph Company (Vt.), 70 Atl., 599.

Franchise Must Be Renewed.

At Sioux Falls, S. D., the United States District Court has decided that the Dakota Central Telephone Company is entitled to maintain its poles and wires in the streets of Huron against the protest of the city council. The case was the result of a franchise granted by the city council of Huron, March 11, 1908. The franchise was granted for ten years at the request of J. L. W. Zietlow and others, giving them the right to erect and maintain poles on the streets, while the company was to furnish the city telephone service free. The telephone rates for the city were fixed by the ordinance.

By a resolution passed July 14, 1907, the city council took action to oust the company from the streets, making the following resolution and sending a copy of it to Zietlow:

"Whereas it is the policy of the city of Huron not to grant a franchise to any public service corporation not controlled by citizens of Huron, and whereas the franchise of the present telephone company controlled by J. L. W. Zietlow expires March 11, 1908, it is resolved to put the Dakota Central Company out of business in Huron within a reasonable time."

Later, January 14, 1908, further resolutions were passed, declaring that the contract or franchise be not renewed. The telephone company on these grounds asked that the city be perpetually enjoined from interfering with its poles and wires. In a cross bill, the city asked that the company be required to remove its poles and wires from the streets within a reasonable time as a public nuisance. The court decided in favor of the telephone company, stating that the city was threatening the destruction of the company's property, not that it might make a better contract with any other persons, but that some citizens of Huron might construct a telephone system within its limits to the exclusion of all others.

Telephone in Customs Case.

Because a firm of New York importers made their protest to a custom house by telephone instead of in writing, they have lost their case before the Board of Appraisers.

In dismissing the protest Judge Sommerville said:

"The importers offered verbally to abandon the merchandise by telephone, which in our opinion was insufficient. The established practice is to the contrary, and any rule would lead to much uncertainty in customs administration, as well as to embarrassing litigation."

City Cannot Remove Poles Without Judicial Authority.

The Southern Bell Telephone & Telegraph Company brought suit against the city of Mobile, Ala., in the Circuit Court of the United States for an injunction to restrain the city from removing its poles and wires from the streets. The statutes of the state (Code Ala. 1896, Sec. 2490) provide that "The right-of-way is granted to any person or corporation having the right to construct telegraph and telephone lines within the state to construct them along the margin of public highways." By charter, the city was given power to establish and regulate sidewalks, streets and avenues, and appurtenances or appendants thereto. Acting under this charter power, the city had adopted two ordinances—one on December 13, 1889, and the other on June 24, 1901, granting the telephone company the right to use its streets and alleys. The city was given the free use of all the company's poles for its fire and police alarm wires, as well as a large number of telephones for the conduct of the public business of the city. The city of Mobile contended that the ordinance of December 13, 1889, was null and void because, under its charter then in force, it had no authority to grant any right or franchise in the streets. It contended that the ordinance of June 24, 1901, was null and void because the company did not make a publication of its application to the general council of the city for the passage of the ordinance, and did not file with the city clerk any proposal of percentage to be paid for the use of the streets.

The court held that the two ordinances were valid contracts irrevocable after acceptance by the company, unless the power to alter or revoke was reserved in them, which was not the case. The city therefore according to the court, had no power to require the removal from the streets of the poles and wires because such action was not based on any finding or claim that they interfered in any way with the safety or convenience or ordinary travel. The court therefore held that the telephone company was entitled to an injunction restraining the city from interfering with its poles and wires.

Southern Bell Telephone & Telegraph Company vs. City of Mobile, 162 Federal, 523.

C. W. Morse's Representations Involved in Telephone Case.

Charles E. Adams of Lowell, Mass., has brought suit in the United States circuit court against the New England Telephone & Telegraph Company for $100,000 damages.

He asserts that in 1901 he was induced to exchange 889 shares in the Boston & New York Telephone & Telegraph Company for a like number of shares in the Telephone & Telegraph Cable Company of America, upon the alleged representations of Charles W. Morse of New York, that he would advance $4,000,000 and cause the Cable company to perform a contract which it had with the Boston & New York Company to construct and operate a system for the latter. At that time, he says, Morse had controlling interest in the Cable company.

LETTERS ON PRACTICAL SUBJECTS

Guy Anchors Made of Concrete.

TELEPHONY has published two or three articles recently in regard to "dead men" or guy anchors, and its readers may be interested in a description of what we have found to be the most durable, cheapest and, all things considered, the best anchor made. We make it ourselves, of concrete, and any telephone manager can have his men make as many as he needs by following this description.

We have a galvanized sheet iron form 4 ins. deep, 14 ins. in diameter at the bottom and 13 at the top, made by a tinsmith. This looks very much like an old fashioned milk pan, turned bottom side up with the bottom out. This form is set on any smooth surface, and about an inch of concrete, covering the bottom, is placed in it. Upon this layer is laid a wire ring, a little smaller than the form, so that it will be entirely enclosed in the concrete. Then we put in another inch of concrete, and then another wire circle; then fill with concrete, tamp well, and smooth off the upper surface even with the top of the form. A bolt, or round stick, a trifle larger than the guy rod to be used, is forced through the middle of the concrete. After this has been done the form is lifted off and in a week the anchor will be ready to use, although it is better to let it lie a month before using. It should be kept damp for two or three days by sprinkling occasionally.

If the concrete is made from cement and sand, it is best to use them in the ratio of 1 to 5. If gravel is also used, 1 part of cement, 3 parts of sand and 4 or 5 of gravel will be sufficient. The ingredients must be mixed thoroughly before wetting and the mass then wet to the consistency of thick mud, so that it will retain its shape after the form is removed. We make the wire circles of junk wire, cutting it into pieces about 3 ft. long, bending the ends around and hooking them together.

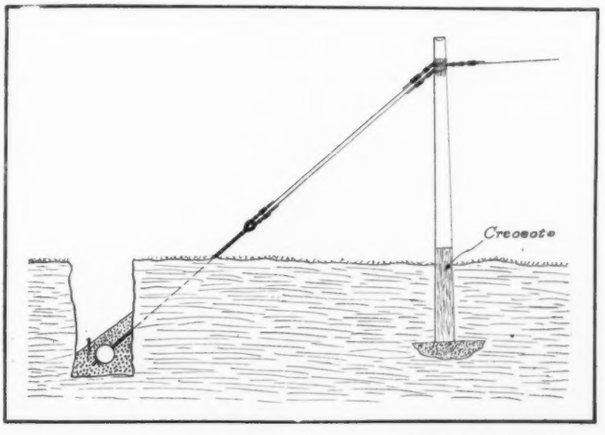
Two men, with proper appliances, can easily make from 75 to 100 anchors in a day. The cost of material and labor combined should not exceed 15 cents apiece and ought not to exceed 10 or 12 cents. We have used hundreds of them, and have never had one break yet.

They are but little, if any more difficult to install than most of the patent iron anchors. They will not rust or decay, and when some geologist, millions of years hence gets to poking around among the debris of some future glacial epoch, he will find them still ready for business, and will probably classify them as the chariot wheels of preglacial man belonging to the stone age, while all other relics of our twentieth century telephone systems will have crumbled away to impalpable dust, including even the original patents and the universal kickers.

Woodbine, Iowa. H. A. Kinney,
Manager Woodbine Telephone Co.

Guy Slugs Set in Cement.

TELEPHONY of November 14 contained an excellent article by Mr. J. M. Plaister on the setting of guy slugs, in which he gave an estimate of the average cost of a guy slug set



Method of Guying Poles Using Cement in Setting the Slugs.

according to his method as not to exceed $6.20. We set our slugs in cement and have not found the cement method more expensive than the "underset" slug method used by Mr. Plaister.

TELEPHONY reached us November 13. The following day we had occasion to set four slugs, and kept a careful record of costs. The results were as follows:

Red cedar log, 8 ins. diameter, 4 ft. long	$0.45
¼ yard sand	.45
1 sack cement	.45
Guy rod, 1¼ in. diam, 12 ft. long, galvanized	2.00
Freight on rod	.26
Drayage	.15
Labor digging hole	1.00
Labor placing slug and filling hole	1.35
Total cost	$6.11

The accompanying diagram indicates our method of guying. We much prefer the use of cement in setting slugs, as the sand and cement can be tamped into all the crevices and irregularities of the hole, and present a front against the solid earth at all points. Slugs underset will not conform to the irregularities of the hole and small cavities will be left between the logs, which might encourage decay and allow the logs to settle forward.

We also make a practice of setting the guy stub pole on cement, especially where there is a heavy downward pressure on the pole. With this method of guying, the proper strain can be placed on the messenger and it will stay right. The only slacking of the messenger strand to be encountered later, after the cable has been placed, will be that which comes from the stretching of the strand itself, practically none from the guy slug or the settling of the guy stub pole.

A red cedar log embedded in cement will prove to be a sort of permanent fixture, something you can tie to for life.

Prairie City, Iowa. Robert L. Parker.

Bad Practice to Run Arrester Ground Beside Other Wires.

Perhaps some of TELEPHONY's readers will be interested in a discovery I made a short time ago. Our telephone worked badly and I took it out and carried it to the manager of our exchange to find the trouble. He rewired it all over. After this we thought it would be all right, but when it had been on the line again for a few days, it bothered us once more. One day we loosened both line wires from the instrument and pulled the line wires out of the wall. In doing so, we discovered that the insulation was burned away on the line wires where it touched the ground wire. As all three wires run through the same opening of the wall, we believe that when a severe, lightning discharge passed over the line it burned through the insulation. I went to work and bored separate holes, one for each wire, and put new insulated wire from the line to the telephone, and since then our telephone works perfectly. I now believe that passing all wires through the same opening is very faulty construction in telephone practice, which causes a great deal of trouble, and that this is not known by all telephone men.

Pierce, Nebraska. Charles Lederer.

Practical Questions and Answers

Life of Gladstone Lalande Cell Operating Pole Changer.

I would like to ask about the life of the Gladstone Lalande Batteries. I am using one model 50 on my pole changer, which I renewed the first day of January, 1908, and it continued to run until the first of December, 1908. During the eleven months it ran all the time, night and day. Now, what experience I have had heretofore with them, shows that six to seven months was the average life.

Did running all the time have anything to do with it, or am I not right as to the life of the battery.

As stated in the query, the life of a Gladstone Lalande, Battery Model 50, is approximately six to seven months when operated under the conditions as stated. This will be readily appreciated when we consider that the resistance of the pole changer relay is 1.5 ohms, and the voltage of the cell under operating conditions, when new, is .7 volt. The capacity of the cell is 300 ampere hours. Therefore, we can readily figure the ampere consumption of the circuit from Ohm's law, thus;

$$I = \frac{E}{R} = \frac{.7}{1.5} = .467$$

which is the current drawn from the cell with nothing but the coils of the relay in circuit. Then if the cell is operated twenty-four hours each day the power consumption per day will be 24 x .467 or 2.034 ampere hours, which means that the life of a 300-ampere hour cell with this consumption would be 4.925 months. Now, the reason why the cell usually runs for six or seven months is that the additional resistance of the wire used in wiring the pole changer relay in circuit and the resistance of the contact point increases the resistance of this circuit materially, since the resistance of the relay itself is so low, and hence the current regularly drawn from the cell is decreased, thus increasing the life of the cell. Furthermore, the voltage of the cell will fall off slightly as it becomes older and this will likewise reduce the current consumption of the relay circuit.

The only way by which we can account for the exceptional life of the cell in the case cited, is that the relay circuit must have contained some additional resistance, so as to cut down the current consumption. If this is not the case, the cell must have had an abnormally heavy charge.

The operation of the cell day and night and all the time did not have any effect on the long life of this cell. In fact, with cells of this type it is economical and good practice to open the battery circuit when the machine is not in use.

Poor Sparking Dynamo.

I have a direct current dynamo. It was made to give sparks for a gasoline engine, but does not make spark enough. I can connect ten dry batteries to it and it will run as a motor. Will you please tell me how to get more current out of it, and show me the proper way to connect the spark coil?

It is almost always best to send a sparking dynamo back to the makers, if it becomes weak. If of the magneto type, the steel magnets are probably weak, and need to be remagnetized. The commutator needs to be cleaned with

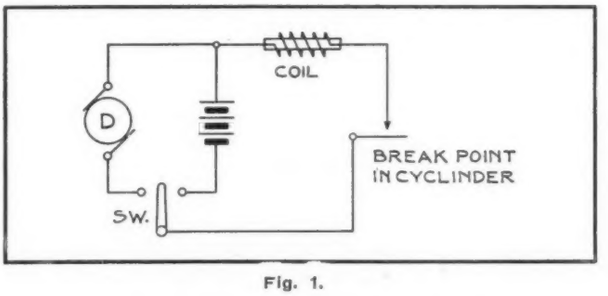


Fig. 1.

fine sand paper and lubricated very lightly with vaseline. It often happens that weakness is due to moisture in the coils, in which case they need to be baked to expel the moisture. Then shellac the coil to keep it dry.

There are two ways to connect a dynamo to a coil, de-

pending on the nature of the coil. If of the break spark variety, Fig. 1 gives the arrangement. The coil, a simple one of a single winding on iron, is placed in series with the source of current. A switch allows you to use dry cells for starting. Fig. 2 shows the arrangement for jump

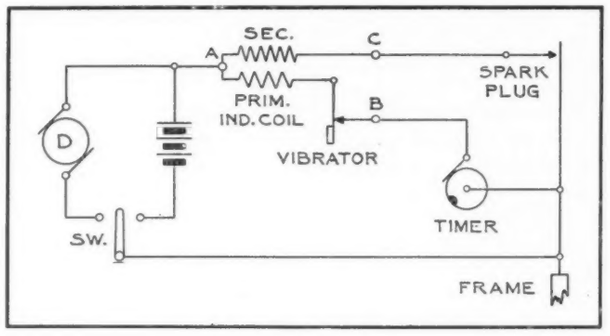


Fig. 2.

spark. Dry cells are used for starting. The primary of the induction coil is put in series with the source of current and the timer, which is run by the cam shaft. The coil usually has three binding posts. *A* is the common terminal of both primary and secondary, *B* the primary alone, and *C* the secondary. They will usually have no marks or letters, though some coils do. You can tell the secondary by the higher insulation which it has.

Magnetizing Force of a Coil.

The magnetizing force in a coil is determined by (1) the current, (2) the number of turns per inch. Is this correct?

Yes, since by the term "magnetizing force" we mean the flux density which the coil can produce in air over the same length of path. The full expression is

$$H = 4\pi I \frac{S}{l}$$

in which I = current in amperes, S = total turns of wire in the coil, l = length of magnetic circuit in centimeters.

Reason for Polarized Bells.

Why are polarized armatures used in ringers? Is it because the current used is alternating, or for tension only?

The reason for polarizing the telephone bell armature is that alternating current is used to ring them. We can see no reason why any tension should be necessary in the ordinary non-biased bell.

Rates and Profits on Rural Lines.

An interesting account of experiences in rate raising on rural lines is the following, by Mr. C. R. Bleakney, Sidney, Ohio.

"By figuring out the cost of producing the service they furnish to farmers' line subscribers a great many companies, in my opinion, may discover that instead of making a profit on this service, it brings a loss of money. And, while the earnings from the entire plant may be sufficient to pay a fair interest on their investments, if they should figure carefully the cost of furnishing each class of service I believe they might discover that they are making the profits on their lines terminating within a certain moderate distance from their central offices carry a loss on their rural, or outlying subscribers.

"Now the question arises, 'how can we remedy this condition?' To change the rates would be a very simple matter if they were to be lowered, but to increase them puts altogether a different face on the subject.

"Nearly three years ago we were in just this position: Our rates for rural service were one dollar per month, or twelve dollars a year, which did not pay the cost of furnishing such service. Unfortunately, as it happened, we had about one hundred and fifty farmers whose contracts expired nearly all at the same date. We notified them, one by one, as they came in, that beginning July 1, 1906, their rates would be changed from twelve to fifteen dollars per year, as at the old rate we were losing money. We made it clear that we had furnished them service at the agreed rate, even though it was at a loss, during the life of the contract which we made with them for five years.

"They of course put up the usual argument that if we could furnish them service for twelve dollars a year at first, we should now be able to furnish it even more cheaply, for we had more subscribers now than we had then, and the greater number we had the cheaper we should be able to furnish service. When we tried to explain that with a larger exchange the greater the cost per subscriber to give service, they could not see it that way any more than we did when we were told the same thing at one time, when were young in the business.

"After holding their meetings in a country school-house they appointed a committee of three to call upon our board of directors, who, after meeting them some two or three times, told them that it was impossible to continue giving them service at the old rate, and, while it was the desire of our company to serve them, we could not continue to do so at a loss. They then said that more than one hundred of them (all of whom were our subscribers), had signed an agreement between themselves that they would not continue to use our service at a price to exceed twelve dollar per year, and within the next few days we received letters from several of them, notifying us that they would not pay the increased rate, and stating that if we expected more than twelve dollars per year we could remove their telephones, as they had signed a contract with the Bell company for service at that price.

"We at once begun the work of removing their telephones, and soon we had taken out some ten or twelve from the houses of the leaders in the movement. Up to this time it looked to be their victory and our loss, but right here we reversed things by going to the balance of them, one by one, offering them a new contract at fifteen dollars per year for a term of either three or five years. We required them to sign this new contract, and where they refused to do so we removed their telephones.

"In many instances they insisted that we allow them to use the telephone without a new contract, saying that they were willing to pay the new rate as long as they used the service. But in no instance did we allow a telephone to remain without a new contract where the old one had expired, and our plan of removing their telephones was carried out. When we had gone over all our rural subscribers' lines we had removed just fifty-two telephones, nearly all of which were replaced within the next three months.

"This fight started in July, 1906, and in July of this year we began taking new contracts for rural service at eighteen dollars per year, stating to all new applicants for service that we were not anxious for new rural business even at that rate.

"This 'discrimination,' as some may term it, may not look just right to every one, but with this method of rate raising we have been very successful, as the old subscriber who has a contract that has not expired generally sits back shaking hands with himself that he has the best of the telephone company, while to the new subscribers we explain that it is only a short time before the increase will be general."

Telephone News

Massachusetts Highway Commission Reports Progress on Telephone Inventory.

Since the Massachusetts Highway Commission began an investigation of the charges of the New England Telephone & Telegraph Company in Massachusetts, steps have been taken to make a complete inventory and appraisal of the company's property in the district under discussion in connection with studies of the traffic. A statement has now been given out from which is quoted the following, as it appeared in the Boston *Transcript* of Nov. 28:

"During the investigation by the Massachusetts Highway Commission into the affairs of the New England Telephone & Telegraph Company it developed that a complete inventory and appraisal of the property of the company would be necessary in order that the total investment could be apportioned over the several classes of service.

"Beyond certain recommendations concerning changes in the practices of the company, relating to frank books, free telephones, selection of employes by the merit system, etc., and the preliminary reduction in certain toll rates between the Metropolitan exchanges and sixteen suburban exchanges within a short distance of the center of gravity of the metropolitan telephone service, no other recommendations seemed possible without such an appraisal.

"Under the direction of a resolve of the Legislature, approved May 26, 1908, such an inventory has been undertaken. The expenses of the work have been paid directly from the State treasury, but the resolve provides for the reimbursement by the telephone company, monthly, of the amounts so expended.

"Within a few days the field work covering the inventory of the property of the New England Telephone & Telegraph Company will have been completed and Professor Dugald C. Jackson, the expert employed by the Highway Commission for this purpose, expects to have his report thereon ready for presentation to the Commission by or before Jan. 1.

"The making of this inventory involved the necessity of cataloguing every bit of material comprised in the plant of the New England company, so that the actual replacement value might be determined. In order to accomplish this work, the State had to be divided and subdivided so that no part of it should be overlooked. Every item of equipment had to be accounted for, every stretch of wire and cable measured, every pole counted and measured, every cross-arm, brace and insulator counted, every manhole and line of conduit inspected and measured and accounted for, and after this had been done the work was checked up in order to verify the original reports.

"The making of the plans for the inventory has been an exceedingly tedious and difficult job. Upwards of three hundred men were placed in the field and it became necessary to supply them with *blanks and instructions* so that their returns might be not only complete, but correct. These plans were worked out by Professor Jackson, acting for the Commission, and Dr. Hammond V. Hayes, formerly chief engineer of the American Telephone & Telegraph Company, but now in private practice as a telephone engineer, the latter acting for the New England company.

"A coast survey map of the State, dividing the State into fifty-three sections, was the basis of the subdivision. These sections were further divided into the cities, wards and towns comprising them and were assigned to squads of three and four men, who walked over the routes, counting and measuring as they went along.

"As fast as a sheet for a completed subdivision of one of these sections was sent to headquarters it was inspected by Professor Jackson or some of his associates. They examined it in detail, but, not contenting themselves with accepting the report as presented, they selected certain parts and privately despatched some of their own experts to make a second examination of these parts, in order to determine the accuracy of the report as a whole. About 10 per cent of all the work was gone over a second time, therefore, for the purpose of determining how accurately it was done in the first instance.

"After Professor Jackson had gone over these sheets and had made such notations as he desired for checking purposes the sheets were returned to Dr. Hayes so that the records they contained might be transcribed and collated. To accomplish this work speedily and accurately about forty clerks were employed, and this force had to be trained under the direction of Dr. Hayes to perform a task of difficult but highly necessary detail.

"The result of this work was not only the plotting of every line of poles and wire, but the separation of the toll lines from the exchange or local lines, and a recapitulation giving every item of material entering into any exchange in the State. So far as is known this is the first instance where a work of this kind has been done with anything approximating the completeness of this inventory. There have been so-called inventories in other sections, but they were more in the nature of general appraisals and represented approximations rather than accurate results, scientifically determined.

"These completed figures were again gone over by the experts for the Commission for the purpose of discovering errors, if any exist, and are subsequently checked to determine the valuation of each item or group of items. Take the valuation of the poles, for example. When the field men were directed to ascertain the number of poles they not only had to count each pole, but also to ascertain its height. This was done in many instances by climbing the pole and using a tape measure, but more generally by using an Abney level, with which a man standing on the ground could accurately measure a pole's height. They then had to note the character of the wood, whether cedar, chestnut, and so on, and also to report whether the pole was set in dirt, brick or concrete. The average cost of poles to the company for a period covering a number of years was then arrived at from the records of the company and plotted on a curve showing the general tendency of average prices.

"Not content with revising these figures, Professor Jackson sent one of his men to various pole centers to make a study of the pole market and the cost of supplying poles in this territory on a basis of competitive bids. Substantially the same course was adopted when it came to ascertaining what would be the cost of replacing the wire and the switchboards. Independent manufacturers of wire were requested to submit competitive bids for the various kinds of wire used by the New England company. They were asked for rock bottom competitive figures, and to make the estimate a definite one rather than a guess, they were told the purpose of the inquiry and were paid for the work involved in the making of the study.

"Independent manufacturers of switchboards were also consulted with reference to the cost of this particular feature of telephone work and made estimates on the same basis. The switchboards used by the New England company are made by the Western Electric Company, and so is a large portion of the other material involved in the construction of a telephone system, and the purpose of the comparison was to determine not whether the same material could be bought more cheaply, but what would be the cost of building an equally efficient system, though of another type. In getting his results he considered replacement costs only and made no allowance for any construction mistakes incident to the developmental stages of telephony.

"The Highway Commission will not announce the results of these various comparisons until Professor Jackson reports that

he has gone over in detail every factor in the equation. He speaks in the highest terms of the scientific work of Dr. Hayes in connection with this inventory and says that the New England company has co-operated wonderfully well in accomplishing a result that, when first outlined, seemed almost impossible of accomplishment.

"The inventory is being continued in the States of Maine, New Hampshire and Vermont, which also are traversed by the lines of the New England company, but in these other States it will not be necessary for the purposes of the Commission to have the results in any such detail as has been outlined in Massachusetts, certain general results being regarded as sufficient. So far as Massachusetts is concerned, it is believed that the Commission will command an absolute record of every item of indexed and classified telephone information that it may deem needful for any future use."

An Egyptian Telephone Exchange.

In a recent number of *The National Telephone Journal* appears an interesting account of the exchange at Alexandria, Egypt, written by Miss Lilian Dakers, the chief operator. She may be seen in the middle of the picture.

The population of Alexandria is about 600,000, composed of people from various countries of both hemispheres, and the city is one of the most cosmopolitan in the world. The hours of labor are not set to any particular time, and the business continues from Monday to Sunday without any perceptible break. The early morning hours are by no means hours of infrequent calls. At 5 a. m. the day's work begins, and it continues until noon, at which time those who can afford it, take a siesta of a few hours,—and it is to be noted that nearly everyone in Alexandria can afford it.

Operating Room of the Telephone Exchange in Alexandria, Egypt.

Among the 3,000 subscribers of the telephone company are people of many nationalities, and there is a corresponding range in the composition of the switchboard staff, among whose numbers are young women who speak Egyptian, French, German, Italian, Maltese, Spanish, Roumanian, and Corfuan. It is compulsory that they speak three languages fluently, viz., French, Italian, Arabic; and they must be acquainted with English numbers.

To an Alexandrian operator the familiar greeting of "Number, please," used by an English operator would be impossible. Therefore the second best direct expression used by them to French, Italian and English is "Central."

This expression is easily understood by speakers of these languages, and the number is at once given. If, however, the caller happened to be an Arab, he would not grasp the word at all, but would immediately ring, thinking there was a fault on the line! Then the special expression for him is "Compagnia."

The finding of a line engaged means that the operator must not merely say "Line busy," and have done with it, but must suit her reply to the language of the caller. For instance, if he is Italian she says, "Numero occupato"; if he is French the response changes to "Numero occupe"; while to an Arab she gives the word "Masfadi."

December Meeting of the Pittsburg Section of the American Institute of Electrical Engineers.

The regular December meeting of the Pittsburg Section of the American Institute of Electrical Engineers was held December 8, in the Carnegie Institute Lecture Hall. Mr. W. Edgar Reed, presiding. The attendance was 110.

The subject for the evening was "Some Experiences in the Use of Gas Engines for Electric Power Generation," an original paper by Mr. J. R. Bibbins, of the Westinghouse Machine Company.

The discussion following the paper was participated in by Prof W. Trinks, of the Carnegie Technical Schools; Mr. W. E. Moore, of the West Penn Railways Company; Mr. Wm. Hoopes, of the Aluminum Company of America; Mr. C. D. Smith, of the U. S. Geological Survey; Mr. E. B. Tuttle and Mr. R. A. L. Snyder, of the C. D. & P. Telephone Company; Mr. J. G. Schroeder, of the Union Switch & Signal Company; Mr. W. F. Flint and Mr. E. B. McClelland, of the Westinghouse Machine Company; and Mr. P. M. Lincoln, Mr. W. L. Waters, and Mr. D. W. Burke, of the Westinghouse Electric & Manufacturing Company.

Pennsylvania Railroad Installs 517 Telephones for Calling Men in Altoona.

All Middle Division trainmen and yardmen of the Pennsylvania Railroad are now called by telephone instead of by messenger. At first the old "caller" system was superseded by only a few telephones as an experiment, but the success was so evident that the company has been gradually extending the system, and now uses the telephone exclusively. The 517 telephones are paid for by the railroad company.

C. W. Morse Alleged to Have Managed $30,000,000 Corporation to Prevent Competition with A. T. & T. Co.

A hearing was held before Judge Brown of the United States District Court, Boston, on December 3, in the cases of Oakes Ames and Francis N. Breed vs. the American Telephone and Telegraph Company. Mr. Breed and Mr. Ames were represented by Whipple, Sears and Ogden, and the defendant by Storey, Thorndike, Palmer and Thayer, attorneys. Mr. Ames alleged on May 29, 1908, that he is the owner of 1600 full paid shares of the capital stock of the Telephone, Telegraph and Cable Company of America, organized in 1899 under the laws of New Jersey, with a capital stock of $30,000,000, divided into 600,000 shares of the par value of $50 each. In 1901 this capital was reduced to $9,000,000, consisting of the same number of shares of the par value of $15 each. The Cable company was organized for operating a telephone, telegraph and cable system, either directly or through the control of other corporations, throughout the United States and foreign countries. In or about the month of October, 1901, about 300,000 shares of the Cable stock had been issued, according to the allegation. Prior to this month the control of the system of telephone companies, formerly held by the American Bell Telephone Company, had been transferred to the defendant, the American Telephone and Telegraph Company, which had thus acquired a practical monopoly of the interstate telephone business of the United States, formerly exercised by the Bell Telephone Company. October 7, 1901, one Charles W. Morse, acting in behalf of the defendant purchased about 245,000 shares of the Cable company from different stockholders thereof, and thereby secured for the defendant, the control of the Cable company.

The plaintiff avers that the defendant purchased these shares and secured the control for the purpose of preventing the free operation of competition in the interstate telephone traffic and commerce which the Cable company had planned to carry on, and in the attempt to monopolize such commerce; that the Cable company has since been managed by the nominees of the defendant and its agent, the said Morse, not for the purpose of developing the business for which the company was organized, but for the purpose of preventing the company from doing business and thus suppressing and smothering the competition which it would otherwise cause to the business of the defendant, until now the company is in the hands of a receiver; and that by the exercise of its control of the Cable company, the defendant has, in fact, since monopolized such interstate telephone commerce. The plaintiff further avers that by such unlawful acts of the defendant in refusing to carry on the business of the Cable company as an independent company, the plaintiff has been greatly injured in his business and property, in that his shares of stock, which were worth, as the plaintiff avers, $15 a share at the time of the purchase of stock by the defendant, have now been rendered worthless. The plaintiff sues for threefold his damages, or $72,000 plus the cost of the suit and a reasonable attorney's fee.

Mr. Breed alleged, on May 29, 1908, that he is the owner of 252 paid shares of the capital stock of the Boston and New York Telephone and Telegraph Company, organized in 1899 under the laws of Delaware, with a capital stock of $5,000,000, divided into 50,000 shares of the par value of $100 each. He alleges that the company was formed in particular to carry on an independent telephone system between Boston and New York, thereby engaging in interstate commerce in competition between those cities with the American Bell Telephone Company, which at that time had a practical monopoly of the interstate telephone business of the United States. The American Bell Telephone Company, and later the American Telephone and Telegraph Company, secured control of the Boston and New York company, as outlined in the allegation of Mr. Ames. The plaintiff avers that this control was for the purpose of preventing the free operation of interstate traffic by telephone, and that by such unlawful acts of the defendant in refusing to carry on the business of the Boston and New York company as an independent property, the plaintiff has been greatly injured in his business and property, his stock in the New York and Boston company has been rendered worthless. Plaintiff sues for threefold damages, or $75,,600, plus costs and reasonable attorney's fee.

On June 29, 1908, the defendant filed duplicate demurrers, stating that the allegations are vague, indefinite and uncertain, that the matters alleged do not constitute a legal cause of action, that nothing is alleged wherein the plaintiffs are entitled to damages, and that no acts or things are alleged whereby the defendant attempted to monopolize interstate commerce.

At the hearing on December 3, the plaintiff's counsel stated that the declaration is founded upon the Sherman anti-trust act of 1890, and that it set out that the defendant's acts are unlawful under sections 1 and 2 of that act, and a claim for threefold damages and costs under section 7 of the act. Section 1 declares illegal any combination in restraint of interstate or foreign commerce, punishable by fine and imprisonment as stated in the act. Section 2 declares an attempt to restrain a misdemeanor, likewise punishable, and section 7 provides for suits by injured parties. Counsel reviewed the allegations of the plaintiffs, taking the Ames case as typical of both. It was then stated that the argument for the defendant was divided into three headings: First, that the declaration sets out no acts of the defendant which are unlawful; second, that the damage to the plaintiff as alleged did not follow from unlawful acts of the defendant; and third, that the plaintiff is not entitled to any remedy under the act. Argument was then presented by the plaintiff to show the illegality of the defendant's acts under the statute.

Anti-Monopoly Injunction Hearing.

On December 14 there was held, at Cleveland, Ohio, a hearing in the proceedings to determine whether the temporary injunction against the American Telephone & Telegraph Company, and the Central Union Telephone Company, to prevent them from interfering with Independent business, shall be permanent.

Long arguments were made by attorneys from both sides. Judge Doyle, for the Bell companies, argued that the court at Cleveland could acquire no jurisdiction over the companies until every local company whose rights are affected should be brought into court.

In reply, the United States company claimed that it is merely fighting for life against the Bell company, and stated that the Bell company had spent millions of dollars fighting the Independents since the organization, twelve years ago, of the United States company.

Vermcnt Independent Companies Oppose Public Utilities Bill.

At a recent hearing on house bills relating to the establishment of a "Public Utilities Commission," the representatives of certain companies of Vermont opposed these bills, chiefly, it appears, because they believe they will tend to assist their competitor in obtaining an advantage in its efforts to bring the telephone business of the state under its exclusive control, and re-establish a monopoly.

Physical Connection to be Urged by Illinois State Grange.

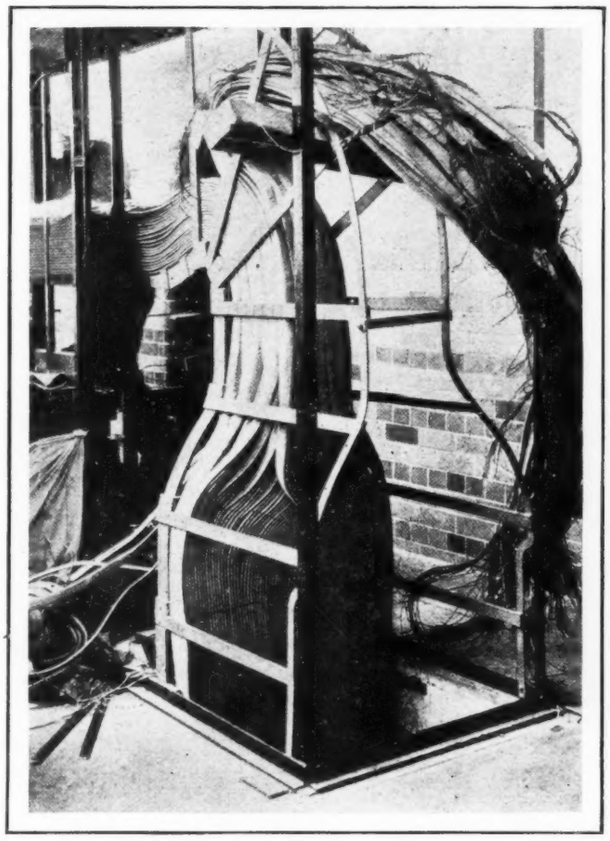
The Illinois Grange, at its convention which closed at Belleville on December 10, adopted a resolution to ask the legislature to compel competing telephone companies to exchange messages on payment of a reasonable charge.

A committee of three, consisting of Oliver Wilson, G. F. Bell, and George R. Tate, has been appointed to deal with this matter before the legislature at the coming session.

An Interesting Cable Run.

The accompanying photograph, reproduced from *The Electrician*, London, shows the cables from the intermediate distributing frame in the terminal room to the multiple run in the switchboard in the new telephone exchange at Cardiff, Wales.

The cables leave the intermediate frame in layers 80 cables wide, while the number of cables on the multiple shelf on a single layer is required to be eight, corresponding to the eight panels of the switchboard. Instead of reducing the width of the run at the point where the cables come out of the intermediate frame, they are carried up, 80 wide, into the operating room, and the modification of the form of the run is made at the point shown in the illustration.



A Cable Run in the Telephone Exchange at Cardiff, Wales.

Telephone Company Sues for Damages from High Tension Railway Current.

The long expected suit involving the priority of rights of one electric company over another and damages for deflecting of the current has been filed in the Adam County Circuit Court at Decatur, Indiana. In this suit the Citizens Telephone Company of Decatur, Ind., complains of the Ft. Wayne & Springfield Traction Company, and alleges that several years ago the commissioners of Adams and Allen counties granted a franchise to the Citizens' Telephone Company for a right-of-way for its long-distance line between Decatur and Ft. Wayne along and in certain highways. The company put up its poles and strung its wires, which were in sucessful use for two years, when the Ft. Wayne & Springfield Traction Company obtained a right-of-way from the commissioners of the two counties to build and operate its line over the same highways or route as that occupied by the telephone company. The complaint alleges that shortly after the traction line began to operate it was found that the great amount of electricity used on the high tension trolley of the traction company overcame the smaller current of the telephone line to such extent as to render the telephone wire useless, and in consequence compeled the telephone company to move its poles and wires to other highways remote from the trolley lines, requiring eight miles of additional poles and wire at an expense of from $5,000 to $8,000, for which amount the telephone company asks judgment. This suit is causing much comment, since every telephone and traction company is interested and concerned in the outcome of the litigation. It is expected that the trial will bring out much expert testimony relative to the effect of high current upon low current plants. It is also expected to bring out evidence along the line of experiences by trolley companies that maintain and operate telephone lines in connection with their trolley lines, frequently using the same poles for the wires, and show that such testimony is irrelevant, although electric railway companies apparently do not yet appreciate the dissimilarity of the two conditions.

Telephone Companies' Rights in Oklahoma.

Oklahoma's twentieth century constitution gives the Independent telephone companies within its bounds the same protection that it does the so-called trust companies, which have a monopoly on business. Prior to statehood, the public service corporations had things their own way and the smaller and weaker telephone companies were forced out of business by the larger corporations. The constitution classes all telephone companies, that are operated for hire, as common carriers and the companies, big or little, are required to transmit each other's messages without delay or discrimination, and to make long distance connections for each other's customers. Several complaints asking for physical connections, filed by Independent companies against the Pioneer Telephone and Telegraph Company, were heard recently before the corporation commission. Several complaints, asking for long distance connections, Farmers' Mutual companies against the Pioneer company, were also heard. The activity of the Farmers' Union Mutual Companies and the Independent city exchanges, in construction of new lines and the organization of new companies to compete with the Pioneer Telephone and Telegraph Company where it has exchanges, promises, with the aid of the Oklahoma constitution, to be the means of revolutionizing the telephone business in the state.

There has been some agitation in some of the larger cities in the state where the Pioneer company has raised its rates, to organize municipal exchanges, as under the constitution the Pioneer company would be compelled to give long distance connections and the cost of operating the exchange would not be nearly as much as the rates demanded. Such action generally exerted, would overthrow the alleged monopoly of the Pioneer Telephone and Telegraph Company within the state except for long distance purposes. The Pioneer company has refused so far to comply with the demands of the Independent companies for physical connections and to transmit their messages over its lines. The action of the Corporation Commission in the cases recently heard is anxiously awaited by the general public owing to the effort of the Pioneer company to raise its rates in various cities in the state.

Extensive Additions Planned for Cleveland Independent Plant.

Reports from Cleveland, O., are to the effect that the Cuyahoga Telephone Company has placed an order for 100,000 feet of telephone cable, and that a large addition to the plant will be started next spring. The probability is that a new sub-exchange building will be erected early in the spring.

two or three years in expectation of the building of this exchange, which will not be available until this building is completed. The improvements, it is said, will add very much more to the capacity of the plant than would be indicated by the amount of money which it is expected to expend on it, owing to the fact that a great deal of the work has already been completed and paid for.

October Report of Cuyahoga Telephone Company.

Large advances over the figures for the corresponding month of last year were, as expected, shown in the report of the Cuyahoga Telephone Company for October. A comparaticve summary is as follows:

	Oct., 1908	Oct., 1907	Increase
Gross earnings	$69,058.50	$66,999.40	$2,059.07
Total expenses	30,559.36	32,903.97	*2,344.61
Net earnings	$38,499.14	$34,095.46	$4,403.68
Interest on bonds	11,283.33	11,250.00	33.33
Surplus	$27,215.81	$22.845.46	$4,370.35
Deductions from surplus:			
Dividend on preferred stock	$ 7,186.75	$ 7,186.75	.....
Dividend on common stock	.....	.....	.....
Reserved for depreciation	3,393.35	2,885.05	708.30
Total deduction	$10,780.10	$10.071.80	$ 708.30
Surplus	$16,435.71	$12.773.66	$3.662.05

*Decrease.

Huron, S. D., Talks of Municipal Telephone Plant.

At a meeting of the city council, held Nov. 30, a proposition was offered for the construction of a telephone exchange in Huron, S. D. The proposition is in compliance with the vote taken at the election last April, when by a majority of 725 voters of the city declared in favor of a municipal telephone exchange system.

An ordinance before the city council provides for the granting of a franchise to F. H. Kent, G. F. Koepp, William Waibel, S. F. Malone, J. H. Hinman, J. V. Campbell and C. E. Bryant. The plan, as stated, is for the grantees under the franchise to construct a telephone exchange mainly from the funds secured by issuing bonds, to be taken mainly by citizens in small amounts. The equity and absolute control of the exchange can then be purchased by the city without the city issuing bonds. Within a period of five years from the date of the franchise, the city has the right under certain conditions to purchase the entire plant.

New Telephone Rate Ordinance in Wichita, Kansas.

A maximum telephone rate ordinance has been passed by the city council of Wichita, Kansas. Under a step-rate plan, it fixes the maximum rate which all telephone companies operating in Wichita must observe. Its provisions apply to both companies now operating in the city and to any other company which may operate in the future.

The new ordinance provides that any company having over 3,000 telephones in use may charge $3.00 per month for business telephones, $2.00 per month for residence telephones and $1 per month for party lines. For over 3,500 and up to 4,000 telephones, the rate on the same basis is $3.50, $2.25, $1.25. For 4,000 telephones and up to 4,500, $4.00, $2.50, $1.25. For 4,500, and up to 5,000 telephones, $4.50, $2.75, $1.50. Over 5,000 telephones, $5.00, $3.00, $1.50.

New President Elected by Massachusetts Institute of Technology.

Professor Richard C. MacLaurin, head of the physics department of Columbia University, has been appointed president of the Massachusetts Institute of Technology by the executive committee of the institute corporation. He will assume the duties of the office as soon as his engagements at Columbia will permit. Professor MacLaurin was born in Edinburgh, Scotland, in 1870. He entered the University of Cambridge in 1892, received the degree of B.A., and in 1896 the degree of M.A. In Cambridge he was a foundation scholar of St. John's College. He was appointed professor of mathematics at the University of New Zealand in 1898. It was while holding that office that he accepted the chair of mathematics and physics at Columbia University.

South Bend Company to Enter LaPorte.

The South Bend Home Telephone Company has applied for a franchise to install ten toll stations in the city of LaPorte, Ind. The petition states that by reason of its being unable to make arrangements with the LaPorte Telephone Company for service connection, due to a working agreement between the LaPorte company and the Central Union Telephone Company, the South Bend company is desirous of installing toll stations so its large number of patrons may be reached by the public at LaPorte.

A Brussels Police Box.

In some of the cities of Belgium, pillars are erected along the streets and used for advertising purposes in a manner similar to the billboards in America.

The police department of Brussels is utilizing some of these pillars, which are of good size and hollow, as telephone booths. As seen in the illustration, there is sufficient room in these pillars for a telephone set and the policeman can also enter, closing the door if desired. The keys of the pillars are only in the possession of the police. When an officer desires to communicate with headquarters, he goes to one of these pillars and telephones. The pillars equipped for police service are designated by little pennants bearing the letter "T."

A Police Telephone Box in Brussels.

Telephone Development in the Netherlands.

Interesting statistics on the operations of the telephone system in The Netherlands for the years 1905 and 1906 have just been published in the Journal Telegraphique. The telephone lines for interurban and international long distance messages had attained the following development on the dates given:

	Jan. 1, 1905.	Dec. 31, 1906.	Increase.
Length of lines	2,302.3 km.	2,671.7 km.	369.4 km.
Length of wires	24,875.7 km.	36,679.0 km.	11,803.3 km.

Of these lines, 2214 km., carrying 29,334.5 km. of wire were built along the railways, and the balance on highways. On account of the large area intersected by canals, the amount of cable is very considerable in The Netherlands, as is indicated by the following figures:

	Jan. 1, 1905. Meters.	Dec. 31, 1906. Meters.	Increase. Meters.
Underground cables	152,351.5	198,101.0	45,749.5
Submarine cables	57,287.3	77,310.3	20,023.0

In the course of the year of 1905 interurban telephone lines were opened for service in 83 new localities, making the total of 182 places provided with this class of service. In 1906 there were added to this number 124 new stations, making a total of 306.

In 1905 the telephone administration of the government of The Netherlands opened new international telephone lines between Rotterdam and Antwerp, Neuzen and Gent, Rotterdam and Dusseldorf, Amsterdam and Brussels, Rotterdam and Brussels, Amsterdam and Breme, and Rotterdam and Duisburg. In 1906 a new line was opened between Rosendaal and Antwerp.

The traffic between cities exclusively within The Netherlands has more than doubled during the five past years, as is shown by the following figures:

Year.	Conversations.	Increase.
1902	1,000,390	Approx. 18 per cent.
1903	1,151,115	Approx. 15 per cent.
1904	1,390,529	Approx. 21 per cent.
1905	1,753,274	Approx. 26 per cent.

The International traffic has also had a development repsenting almost a correspondingly great increase. The figures being approximately as follows:

	Conversations exchanged with		Approximate increase of traffic in per cent, with	
Year.	Belgium.	Germany.	Belgium.	Germany.
1902	31,096	30,157	28	45
1903	35,796	40,873	15	36
1904	40,246	58,179	12	42
1905	49,722	102,603	24	76
1906	58,600	145,741	18	42

Concerning financial results not much information is given, but total expenditures and receipts were as follows:

	1905.	1906
Expenses	9,013,377 fr.	Approx. 9,045,748 fr.
Receipts	5,742,969 fr.	Approx. 6,424,547 fr.
Excess of expen s over rec'pts.	3,270,408 fr.	Approx. 2,621.201 fr.

Sleet Damage to Japanese Telephone Lines.

At a recent meeting of the Electric Science Association, at Tokio, Japan, there was presented by Mr. S. Kanda, who has been an engineer in the employ of the government for twenty-five years, a very interesting paper dealing with the damage by snow and sleet to telephone and telegraph lines.

Mr. Kanda referred briefly to the inconvenience and damage arising from this cause in foreign countries, and stated that the severe snow storm of April 9, 1908, in the vicinity of Tokio, did more damage than any other so far known in Japan.

The total breadth of the area covered by the Tokio snow storm hardly exceeded forty miles, but in this district the fallen poles numbered over 1,000, while more than 13,000 crossarms were torn off or damaged. Of 17,000 subscribers' lines in Tokio, only 5,800 remained in good working condition.

An examination of the broken poles showed that the larger number of breaks occurred either close to the ground, or at the lowest pole gain. Many poles were found leaning badly to one side or another, a condition which is only a little less dangerous than actual breakage, to which, in fact, it usually leads if the storm is sufficiently long continued.

The snow which fell during this storm was very wet, and an observer reported that it weighed 16.3 lbs. per cubic foot. The load observed on the wires was approximately cylindrical in form, and its diameter in places was as great as 3¾ in.

Mr. Kanda, in his talk, gave mathematical demonstrations, and quoted tables upon which he based conclusions as to the best measures to adopt to minimize the risk of damage. The principal points to which he called attention are the desirability of using short spans, having lines run asr nearly level as possible; avoiding soft swampy ground; placing an ample number of guy wires, and using straight poles.

Another Telephone Company in New York State Applies to Supreme Court for Reduction on Tax Assessment.

The Central New York Telephone & Telegraph Company has applied to the Supreme Court at Albany, N. Y., for a reduction of its tax assessment in the town of Whitesboro. The company claims that while all other property has been assessed at 81 per cent of its actual value, the figure upon which the telephone company's tax is based is 100 per cent of its appraisal.

The tax attorney of the telephone company has addressed to the supervisor of the town a letter advising him of the company's taking the matter up with the proper authorities to secure a reduction. It is stated, however, that the town of Whitesboro is anxious to compel the holders of special franchises to pay as heavy a proportion of tax as possible, and will fight the efforts of the telephone company to obtain a reduction.

Several companies operating in other towns have had to secure rulings before this, requiring reductions in assessments which were shown to be too high.

Oklahoma Corporation Commission Awaiting Decision of Supreme Court.

The additional complaints, filed before the Oklahoma Corporation Commission by the citizens of Hartshorn, McAlester, Tulsa, Henryetta and Durant protesting against the raise in telephone rates, have been continued by the Commission pending the final determination of the Hartshorn case before the Supreme Court, in which the legal question of "whether a telephone company could raise its rates above those specified by the franchises granted them by the cities" is involved.

An Argument Against Becoming a Sublicensee of the Bell Company in Missouri.

The Lafayette Telephone Company of Higginsville, Mo., has brought suit agaist the Kansas City Independent Long Distance Telephone Company to compel it to connect its long distance lines with the exchange of the Lafayette company. The case is set for an early hearing.

Until recently, the Lafayette company had the use of the Independent company's long distance service, but without the formality of a consultation, connection was made with the Bell company's lines. The Independent company then promptly disconnected with the Lafayette company and established a connection with a new Independent plant in Higginsville, which had recently been built there, and which, until that time, had but about 25 telephones. Now this new Independent plant has 400 telephones and the Lafayette company has but 25 where it formerly had 350.

Meeting of the Electrical Trades Association of Chicago.

The thirteenth annual meeting and dinner of the Electrical Trades Association, of Chicago, was held at the Chicago Athletic Association, December 11. After the dinner there was a short business session, during which reports of the officers and committees were presented.

The secretary's report showed that the membership of the association is steadily increasing. Since the organization of the association, in 1896, some 12,300 names have been reported to the association by the members as not paying their bills promptly. Of this number, some 11,600 have paid through the efforts of the organization.

Officers for the coming year were elected as follows: W. A. Brown, president; F. M. Pierce, vice-president; Frederic E. Vose, secretary-treasurer.

After the meeting, Toastmaster Thomas E. Stacey introduced the following speakers: B. E. Sunny, president of the Chicago Telephone Company, who spoke on the "General Situation"; Mr. A. O. Kuehmsted on "Efficiency"; Albert H. Elliot, secretary of the Pacific Coast Association, on "The Eagle and Other Birds"; F. M. Pierce on "Sales and Credits"; Jos. A. Barbour, ex-Assistant State's Attorney, on "Reminiscences."

Mr. Sunny spoke of the general situation in the electrical business, and prophesied that the coming year would be a prosperious one, and that in 1910 business would again be booming. He based his prophecy upon the statistics of a large electrical manufacturing company, which shows that the years immediately following presidential elections have been prosperous, while the year of the election has been usually one of great business depression.

Referring to his connection with the Chicago Telephone Company, Mr. Sunny spoke of the advisability of telephone companies having a Credit Department to investigate the financial standing of future subscribers before installing their telephones. When the telephone was first brought out, only the most prosperous people were able to afford it, and the question of credit did not arise, but now the cost of the telephone is within the reach of most people. Hence, there is a necessity for investigating the financial standing of prospective subscribers before installing the telephone. As the telephone company does the wiring in the house, and furnishes the instrument, if it is unable to collect from the subscriber it suffers a financial loss.

As an illustration of the value of the Credit Department to the telephone company, Mr. Sunny stated that at the beginning of the year, the Chicago Telephone Company had orders for 8,000 telephones. These orders were turned over to a Credit Department, which investigated the financial standing of the prospective subscribers. Out of the 8,000 names, 2,500 were rejected as being in the doubtful class. These were notified that a deposit would be required before the telephone would be installed, the deposit to be refunded at the end of the year with interest added. Of the recipients of the 2,500 notices sent out to this effect but 400 were able, or willing, to pay the deposit fee and secure a telephone.

American Railway Association Endorses Telephone for Dispatching.

For some months a committee of the American Railway Association has been investigating the merits of the telephone as a substitute for the telegraph in train dispatching. As a result of the decision in favor of the telephone, the association, at its last meeting, passed the following resolutions:

"Whereas, The extended use of the telephone as a substitute for the telegraph has demonstrated that it can be safely used for train operation; and

"Whereas, The substitution of the telephone for the telegraph in blocking and dispatching trains has developed many advantages in favor of the telephone in saving time in the various operations and with the same degree of safety as has been done heretofore by the telegraph; be it

"Resolved, That, in the opinion of the American Railway Association, the substitution of the telephone for the telegraph in blocking and dispatching trains can be made safely and the use of the telephone for such purposes is recognized and recommended as a standard operating instrumentality."

On the committee which investigated this subject were the following prominent operating officials: F. C. Rice, chairman, Chicago, Burlington & Quincy Railway; M. S. Connors, Hocking Valley; A. M. Schoyer, Pennsylvania; W. G. Besler, Central Railroad of New Jersey; R. H. Alston, Chicago & Northwestern Railway; F. B. Harriman, Illinois Central Railway; W. J. Harahan, Erie; W. A. Garrett, Seaboard Air Line; J. F. Deems, New York Central Lines; M. B. Cutter, Lehigh Valley; E. C. Carter, Chicago & Northwestern, and A. J. Cota, Chicago, Burlington & Quincy.

Central Union Telephone Company Obeys Injunction.

The working agreement between the Central Union and the Richmond Home Telephone companies at Richmond, Ind., by which the long-distance service of the former was provided patrons, has been discontinued. Acting on the Ohio court's order enjoining the Central Union from alleged interference with Independent companies, the company's manager at Richmond was ordered to sever all relations with the Richmond Home Telephone Company. As a result the Central Union is not giving long-distance service to patrons of the Independent company unless they go direct to the Central Union office.

It is understood a similar order has been carried out at Butler, Ind., where conditions are similar, and at all other points covered by the order of Judge Tayler.

Death of Professor Ayrton.

Electrical engineers throughout the entire world learn with deep regret of the death of Professor William Edward Ayrton, of London, on November 8.

Born in 1847, Professor Ayrton first showed his distinguished ability in the Indian telegraph service. Leaving India after four years of able service, he spent a year in studying the building of the Atlantic cable, and then went to Tokio, where he and Professor Perry laid the foundation of technical education in Japan, and, their united efforts continuing after both had returned to England, they found time to make many valuable inventions of electrical measuring instruments and other devices. From 1879 to 1884 Professor Ayrton was Professor of Applied Physics at the Finsbury College of the City and Guilds of London Institute, where, a few years later, Perry joined him as Professor of Mechanical Engineering, and was then transferred to the Central Technical College of the City and Guilds Institute, where he held the post of Professor of Electrican Engineering up to his death.

Professor Ayrton made a profound impression upon thousands of students, some of whom have themselves become famous engineers.

In 1901 the Royal Society awarded Professor Ayrton a Royal Medal, and he received many other distinctions. In 1892 he was President of the Institution of Electrical Engineers, and for a long period he was treasurer of that body.

Not only have his inventions been of the greatest benefit to the electrical art, but his writings, which show close scientific reasoning power, and exceptional literary ability, have aided in building up for him a reputation as one of the great electrical engineers of the world.

Morgantown Plant Purchased by Strong Independent Interests of West Virginia.

A short time ago the Independent companies of West Virginia were in some doubt as to the future of the People's Telephone Company, at Morgantown. It was feared that the persons owning the controlling interest in this plant, not being in close sympathy with the objects of the other Independent companies in the state, might dispose of the company in such a way as to bring it under the control of a competitor.

In order to make such action impossible, a group of leaders in the Independent telephone business of West Virginia arranged to purchase the company outright. According to the latest reports, the plant was purchased by S. A. Moore for the West Virginia Western Telephone Company, the Consolidated Telephone Company, and the National Telephone Company, of West Virginia.

Although the first consideration has been paid, and the contract drawn, the property will not be turned over to the new purchaser until the 2nd or 3rd of January.

The plant will be owned by a new company, now being organized under the name of the National Telephone Company of Monongalia County.

The board of directors will consist of John A. Howard and W. C. Handlan, of Wheeling, representing the National company; J. Walter Barnes and C. E. Manley, of Fairmont, representing the Consolidated Telephone Company, and A. C. Davis and one other, representing the West Virginia Western Telephone Company. The executive committee will consist of J. Walter Barnes, W. C. Handlan and A. C. Davis.

Morgantown is one of the most important points in West Virginia, and is especially valuable to the Independents of that state on account of its location and possibilities of building up an increased business over toll lines with Pennsylvania points.

Its purchase by the now controlling interests will insure its adequate development and operation in accordance with the best principles of Independent practice, and is a matter of congratulation not only to West Virginia companies, but to the Independents operating in a considerable section of Pennsylvania.

Southern Bell Eliminates Prospect of Competition in Jacksonville, Fla., and Advances Rates.

Business men of Jacksonville, Fla., are wondering what kind of a position they are in with respect to telephone service. Just before the first of December announcements were made in a local paper harping on the great benefits which would come to certain points, particularly Jacksonville, through the consummation of an arrangement whereby Southern Bell toll lines were brought into the exchanges of the East Florida Telephone Company, the Ocala Telephone Company, and the Brooksville Telephone Company, formerly Independent.

It is known that, up to this time, the East Florida Telephone Company, of Gainesville, had some ideas about entering Jacksonville, and developing an Independent exchange system there. It is fair to assume that the contract entered into between the East Florida company and the Bell interests contained the usual clause found in sub-license contracts, or a modification of it, limiting the territory in which the East Florida company might operate. By this means, the Southern Bell company secured to itself the freedom of exclusive operation in Jacksonville, so far as any competition from the East Florida company might be concerned.

Now come, in the Jacksonville papers of December 18, announcements of a new schedule of rates embodying substantial advances for the Bell service in Jacksonville. The announcement in the advertising pages is accompanied by an alleged interview with J. M. B. Hoxsey, of Atlanta, special agent of the Southern Bell company, stating reasons for the advance, in the body of the paper. This was reproduced as paid matter, although the asterisk which indicates that it is advertising is so small, and inconspicuously placed at the end of the line that it would escape the observation of the casual reader.

Sale of Maine Company to Competitor May Be Set Aside.

On December 16, all the property of the Northeastern Telephone Company was sold at Portland, Me., under decree of foreclosure to Franklin C. Payson, representing the New England Telephone & Telegraph Company (Bell), the Independent company's competitor. The upset price was $275,000.

At the time the sale took place, an action was pending to restrain the Bell interests from becoming bidders at this sale on the ground that this action would be in violation of the Sherman anti-trust law. Because the minority stock and bond holders, represented by Jabez True, were unable to reach Judge Putnam in time to procure an injunction, it is believed that a bill in equity will be presented to dissolve the sale.

New Financing Expected to Strengthen Eastern Michigan Companies.

A new Independent telephone company, with an authorized capital stock of $2,500,000, has been organized to do business in the extreme eastern part of Michigan. It is to be known as the Valley Home Telephone Company, and will operate, at first at least, in the "Thumb" district of Michigan, taking in Bay City, Saginaw and Flint and the adjoining country.

The organization of this company has been under way for a year, its purpose being, it is announced, to buy up the present system of the Saginaw Valley Telephone Company, which is now serving the cities above named, but which has been hampered during the past and prevented from giving good service by lack of funds, especially in Bay City, where the new organization proposes to put in a new exchange.

The stock to be issued consists of 25,000 shares, $100 each, $1,500,000 preferred and $1,000,000 common. As soon as sufficient stock is sold, it is the intention to take over the system of the old Valley company, and begin the erection of the new plant at Bay City.

The first board of directors consists of Frank T. Woodworth, E. T. Carrington, George E. Wedthoff and F. W. Kesseler, of Bay City; John L. Jackson, John F. Brand, C. O. Trask and John J. Speed, Saginaw; R. B. McPherson, Howell; James J. Gibbs, Ithaca, and Charles W. Liken, Sebewaing.

It is believed by telephone men throughout the state that the new organization bids fair to be a great success. Just as with every new organization, there will be some uphill work at first, but the directors have made a move in the right direction at the start by electing James T. Gibbs as secretary, treasurer and general manager. Mr. Gibbs was formerly vice-president of the Union Telephone Company, and has had much to do with the success of that company, and is considered to be one of the best telephone men in the state.

No Decision in Mandamus Proceedings to Open Conduits to New York Independent Telephone Co.

On December 11, Justice MacLean heard arguments in connection with the application for a peremptory writ of mandamus to compel John H. O'Brien, Commissioner of Water Supply, Gas and Electricity, of the city of New York, to permit the New York Independent Telephone Company access to ducts of the Empire Subway Company.

The application was based upon a franchise granted to the Mercantile Electric Company, a concern originally organized to carry on a burglar alarm business. The New York Independent Company, to whom the franchise and other rights were assigned in 1905, claims that this permit enables it to carry on a telephone business.

Justice MacLean reserved decision on the application.

Notes on the Electrical Engineering Department, Massachusetts Institute of Technology.

As is well known, the Massachusetts Institute of Technology maintains very strong undergraduate courses in engineering, but it is not so well known that the Institute is attended by what is probably the largest number of graduate students in any of the engineering schools in the country. There are now 215 graduate students studying at the Massachusetts Institute of Technology. The degrees of these men have been conferred by colleges and engineering schools through the length and breadth of the continent.

A notably large number of the young men studying electrical engineering at the Institute of Technology come from among these graduate students. Many of these students in the electrical engineering course have heretofore pursued a course in arts or a course in general science and are spending two or three years in completing the electrical engineering course at the Institute of Technology. Others have graduated from other engineering schools and are spending from one to two years in study at the institute to get its baccalaureate degree in electrical engineering; and a few of particularly high preparation are pursuing advanced study and research for the purpose of obtaining the higher degrees of master of science in electrical engineering or doctor of engineering.

It is probable that the latter students occupied in advanced study and research are enjoying the first regularly organized work in this country leading to the degree of doctor of engineering. That degree has heretofore been conferred by American engineering schools as an honorary distinction, but it has not in this country been recognized among the degrees to be secured by study and research in the schools. Brilliant work has been done by students studying for this degree in the great polytechnic schools at Berlin and Carlsruhe, Germany, and work of this nature at the Massachusetts Institute of Technology bids fair to become popular with students of the highest ability and to be influential in the development of engineering research.

The undergraduate electrical engineering course at the Institute of Technology has a senior class which is twenty per cent larger this year than last year, and the department will soon be a candidate for larger quarters. The laboratory quarters are large and are impressive in their equipment, but even they are becoming overcrowded, and additional class rooms are much needed. The prospects of entering into large quarters are bright with the advent of the recently elected president, Dr. Richard C. Maclaurin.

Next Meeting of Eighth Missouri District.

Members of the Eighth District of the Missouri District Independent Telephone Association, will meet at Springfield, January 12, for their second meeting since the organization was perfected. The meeting will be held at the Colonial hotel. The Eighth district association was organized in Springfield about three months ago and includes owners and managers of Independent exchanges in several counties adjacent to Greene. This organization made an auspicious start, and the next meeting is expected to be a good one.

Compensating for Inductive Disturbance from Single-Phase Current of New Haven Railroad.

Mr. W. S. Murray, in a valuable paper, "The Log of the New Haven Electrification," presented at a meeting of the American Institute of Electrical Engineers on December 11, made the following reference to electrification in its relation to telegraph and telephone lines:

"Single-phase electrification affects telegraph and telephone systems whose wires lie parallel with and in close proximity to the railroad. The corrective for this disturbance has proved to be simple and not costly. Briefly described, it consists of compensating transformers, whose secondaries are a part of the telegraph and telephone wires and whose primaries receive their voltage from pilot wires strung on the same cross-arms as those bearing the telegraph and telephone wires, and thus having impressed upon them the same voltage, by electromagnetic induction, as the telegraph and telephone wires. The transformer secondary voltage is approximately equal and opposite to the induced voltage on the telegraph and telephone wires and thus constantly compensates for it throughout all ranges of induction due to the single-phase wires.

"An interesting commentary on the efficacy of the compensating transformer is that its use obviated the necessity of any change in the physical location of the telegraph and telephone lines within the zone of induction, and has thus been the means of removing what at first was rightly considered a very offensive attribute of the single-phase system."

Home Company Favored for Schools in Oakland, Cal.

Reports from Oakland, Cal., show that recently the system of the Home Telephone Company was chosen to supersede that of its competitor, the Pacific Telephone & Telegraph Company (Bell), for the city schools.

The Bell company had in service a branch exchange which required the attention of an operator, while the Home system, which supersedes it, gives satisfactory service without an operator. The Oakland *Enquirer*, in commenting upon the contract award, says that the Home system "gives sure and rapid service, and is giving universal satisfaction."

Emphasis is laid upon the Home company's success on account of the fact that the chairman of the committee which recommended the awarding of the contract is a stockholder of the Bell company, and yet the vote was seven to two in favor of the Independent service. The Pacific company, rather than withdraw its telephones from the schools, has offered free service, and the offer has been accepted. The Home Company gets paid a fair price for its service.

Remarkable Progress of Home Telephone Company of Detroit.

The issuing of a new directory by the Home Telephone Company, of Detroit, Mich., calls attention to the notable advance which this company has made in the few months of its operation. The directory now is of such substantial size as to compare favorably with those of many of the companies which have become well established in our large cities. The classified list shows that a large number of Detroit's leading business houses are subscribers for the new service.

The company had installed on December 11, a total of 11,126 telephones, which is an average of 1,000 per month since it commenced operation. In the past few weeks several solicitors have been added to the force, and there is very reason to expect that no less than 15,000 telephones will be in service before Ferbuary 1. Collections are coming in well, and the company's service is so excellent that satisfaction is expressed by subscribers in all parts of the city.

Los Angeles Home Company Has Good October Business.

The Home Telephone & Telegraph Company, Los Angeles, Cal., in the month of October had a gain of 414 in the number of telephones in use in Los Angeles, and the same month shows a gain of about $7,000 over the same month last year in the amount of business done.

A Missouri Independent Company Commended.

The following from the *Scott County Citizen* of Morley, Mo., speaks well of the enterprise of the Independent Telephone company operating in that territory:

"The Southeast Missouri Telephone Company showed commendable enterprise in furnishing the cities in its territory with free election return service on the night of November 3, going to the expense of putting in telephones and furnishing large posters to mark the locations of the stations where everybody could secure all the earliest election news. In many instances throughout its entire territory, the telephone company furnished earlier and more correct news than did the Western Union Telegraph Company, who received large sums of money for the special telegraph service."

Baltimore & Ohio Railroad to Replace Call Boys by Telephones.

It is reported that the Baltimore & Ohio Railway is to follow the example of the Pennsylvania, and replace the call-boy system by the use of telephones. This will mean the installation of telephones, at the company's expense, in the homes of a very large number of employes at different points along the line.

Telephone Patents

Conducted by Max W. Zabel

GROUNDING CLAMP.

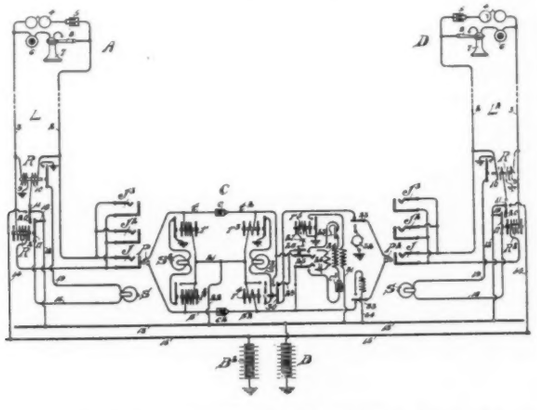
V. H. Vibber, New London, Conn., patent 905,773, Dec. 1, 1908.

This grounding clamp consists of a cylindrical shell, designed to be fastened around the grounding pipe. It is held together by means of the two radial ends, fastened by a bolt and nut. A portion of the periphery of the cylindrical shell is bulged outwardly, the ends of the bulge having holes through which the grounding wire can be passed. The arrangement is such that when the grounding wire is passed through the bulged portion, it is clamped firmly to the pipe when the nut is screwed up on the bolt.

TELEPHONE SYSTEM.

W. W. Dean, Chicago, Ill., patent 906,513, Dec. 15, 1908.

In the present invention it is designed to provide a common battery circuit for doing away with the click or noise caused in the waiting subscriber's receiver when the operator answers the call. Two sources of current B and B_2 are used, the battery B being normally connected to the lines, and serving to supply current to operate the line relay. R. Each line, of course, also has a cut-off relay R_2. When the plug P is inserted to answer a call, current is sent through the relay R_2 and the clearing-out relay r_2, and this permits a sufficient energization of the relay R_2 to engage spring 17 with the spring 20, but not sufficient to disengage the spring 20 from its contact. Then when the plug P_2 is inserted in the called-line, current flows through



the supervisory relay r_4, and as this relay has a great deal less resistance than the relay r_2, the relay R_2 is energized more strongly, and breaks away the springs 20 from its back contact, and serves to connect its front contact, thereby putting the line in condition for conversation without at any time disconnecting the central battery, which disconnection, it is claimed, causes the objectionable click in the receiver.

NON-EXPLOSIVE ENCLOSED LINE FUSE.

Frank B. Cook, Chicago, Ill., patent 905,503, Dec. 1, 1908.

In this invention a fuse is provided having a very small bore, through which the fuse wire extends. In general, it is of the shape of the so-called enclosed line fuses.

The object of the small bore is to reduce the amount of air therein to a minimum, thereby reducing the chance of an explosion when the fuse blows. For this purpose the tube or casing used for the fuse is somewhat porous and adapted to absorb a considerable quantity of the gases formed by the blowing of the fuse.

TESTING TELEPHONE FOR TELEPHONE LINES.

W. W. Dean, Chicago, Ill., patent 905,854, Dec. 8, 1908.

Means for properly controlling an auxiliary test relay common to a plurality of cord circuits are set forth in this patent. The invention is an improvement on patent 864,454, and consists in means whereby the connection of the normally isolated testing relay with a cord circuit for testing the condition of a called line is automatically accomplished in the operation of other parts.

TRANSMITTER BRACKET.

E. S. McLarn, New York, N. Y., patent 905,907, Dec. 8, 1908.

This invention relates to pivotally mounted telephone transmitters, and is designed to provide a new form of knuckle or bracket which is mounted upon the front of a telephone set, and which is connected to the lug provided upon the cup of the transmitter.

The device in general consists of a bracket arrangement, having inwardly bent walls, and curved bearing walls for the transmitter lug. A clamping screw holds them all together, and a plate screwed to the bracket arrangement attaches it to the transmitter, through the telephone box.

CABLE HANGER.

C. G. Harrington, Maplewood, Mo., patent 905,873, Dec. 3, 1908.

The above patent discloses a new style of cable hanger, consisting of a sheet metal suspension, which is to be wrapped around the messenger wire, and the cable, in connection with an expansible locking member, which passes through a portion of the sheet metal suspension after it has been wrapped around the cable. The expansible locking member is in the nature of a spring clip.

In the Manufacturing Field

The Automatic Electric Company's Bulletins.

From time to time the Automatic Electric Company of Chicago issues bulletins descriptive of advances in automatic telephony. They are always full of news interest and contain much valuable information.

A great many telephone men have an impression that these bulletins are mailed only to managers of telephone companies but such is not the case. The company will be pleased to send them to all superintendents, engineers, traffic managers, wire chiefs and chief inspectors of Independent telephone companies who desire them.

A New Style of Splicing Clamp.

A new splicing clamp has recently been placed in the market which is radically different from those in common use.

Fig. 1 shows the form of the clamp and Fig. 2 the method of using it. As shown in the illustrations, there is a slotted wheel on one of the jaws, used to hold the sleeve or wires which are to be spliced. The wheel can be revolved on its axis so as to be used with various sizes of wire and sleeves.

In making an ordinary Western Union splice between bare wires, the wires are first clamped between the jaws and one-half of the splice is twisted. The splice is completed by clamping the finished side and then twisting the remaining half. It is claimed that the galvanizing is not scraped off the wire in making the splice and that there is no tendency of the handles to spring apart.

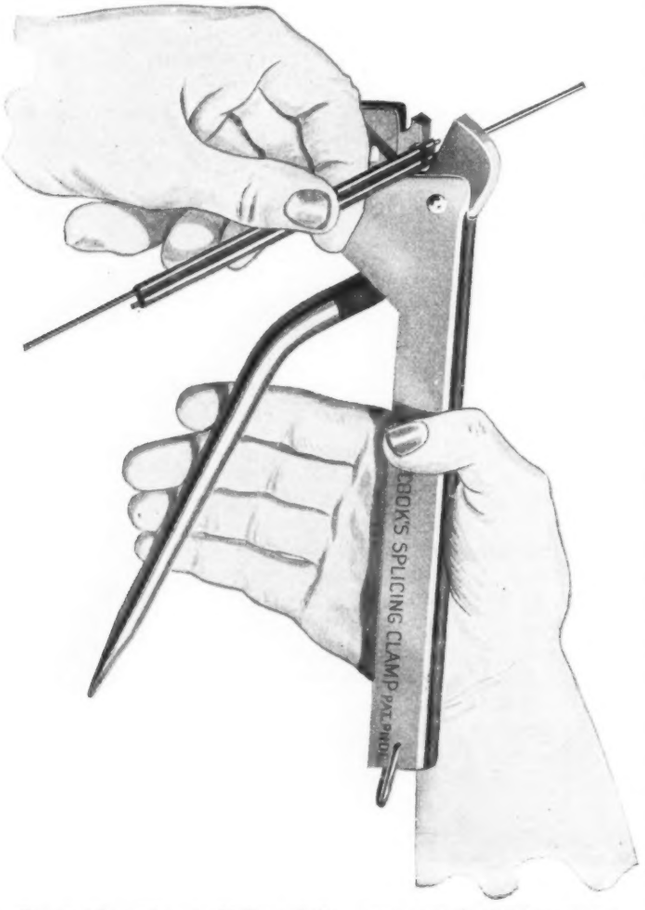


Fig. 2.—Preparing to Make a Splice with a Cook Splicing Clamp.

The clamps, which are manufactured by Frank B. Cook, 246 West Lake street, Chicago, are made in 10-in. and 13-in. sizes, giving a range from No. 4 to No. 18 on sleeve joints and from No. 0 to No. 14 for bare wire. It accommodates six different sizes in copper sleeves, and six different sizes of copper or iron wire.

Fig. 1.—The Cook Splicing Clamp.

Intending Exhibitors at the Chicago Electrical Show.

The time for the Chicago Electrical Show is rapidly drawing near and all indications are that it will be most successful from every point of view.

Among the concerns that have contracted for exhibit space are: Commonwealth Edison Company; Wagner Electric Manufacturing Company; Federal Electric Company; Cutler-Hammer Company; Western Insulation Company; Murphy Electricity Rectifier Company; National Battery Company; Perfection Vacuum Cleaner Company; Chicago Fuse Wire & Manufacturing Company; Electric Appliance Company; The Excello Arc Lamp Company; The Stolz Electrophone Company; Stromberg-Carlson Telephone Manufacturing Company; Mathias Klein & Sons; Telephony Publishing Company; Manhattan Electrical Supply Company; Ft. Wayne Electric Works; Benjamin Electric Company; Central Electric Company; International Correspondence Schools; McRoy Clay Works; Chicago Pneumatic Tool Company; Appleton Electric Company; Popular Electricity; Swedish-American Telephone Company; Westinghouse Electric & Manufacturing Company; Swedish Electric Vibrator Company; Electrical Testing Laboratories, New York; General Electric Company; Electric Storage Battery Company; Crane Company; Pyro One Light Sign Company; Shelton Electric Company; Lindstrom Smith and Company; Electrical World; Electrical Record; Robbins & Myers; United Pump & Power Company; Commercial Appliance Company; Electric City Publishing Company; Taussig & Babcock; Western Electrician; Autoelectric Sign Company; American Steel & Wire Company; National Acme Manufacturing Company; Hahl Automatic Clock Company; Peerless Light Company; Palm Engineering Company; Pacific Electric Heating Company; Duntley Manufacturing Company; National Automatic Advertising Company; Jewell Electrical Instrument Company; Roth Brothers Company; Crescent Company; H. W. Johns-Manville Company; Red Cross Antiseptic Company; Northern Electrical Manufacturing Company; A. W. Kratz; Illinois Electric Renovator Sales Company; Hurley Machine Company; National Electric Lamp Association; Electrocraft Publishing Company; The Caloric Company; The Allis-Chalmers Company; Cyclone Vacuum Cleaner Company; North Shore Electric Company; Simplex Company; F. B. Badt and Company; Mechanical Appliance Company; Connersville Blower Company; Electric Cleaner Company; Pelouze Electric Heater Company; C. S. Neville & Company; American Electric Fuse Company, and Mears Ear Phone Company.

Mr. John R. Searles, assistant to President and General Manager Lewis H. Jones, of the Detroit Copper & Brass Rolling Mills, spent several days in Chicago attending the International Independent Telephone Convention, where he made many friends. Mr. Searles' company, which is one

of the oldest and largest in the West, has recently added to its equipment a very large and complete wire mill, and is now prepared to furnish copper wire of a high grade.

THE AMERICAN ELECTRIC FUSE COMPANY, Muskegon, Mich., in some new literature, has called attention to the enclosed fuse shown in the accompanying illustration. The tube is made of

The Porcelain Enclosed Fuse of the American Electric Fuse Co.

unglazed porcelain, which, being porous, permits the escape of gases generated by the blowing of the fuse.

The characteristic feature of this fuse is the method of passing the fuse wire through the tube. The porcelain has three longitudinal channels through which the wire passes, first through one, then back again to the second, and then along the full length of the tube to the third channel, thus bringing the terminals of the fuse wire out at opposite ends of the tube.

Two styles are made; the type "V" for use in cable, terminals, etc.; and type "W" for use as a line fuse. Both are 3-way fuses.

THE EVERSTICK ANCHOR COMPANY, St. Louis, Mo., has recently received some very high commendations from telephone companies which employ its device. The following abstract from a letter from the Point Pleasant Telephone Company, Pt. Pleasant, W. Va., may be of interest:

"We have just completed a toll line from Pt. Pleasant, W. Va., to Pomeroy, O., 25 ft. 8 in. and 10 in. top chestnut poles, with standard 10 pin arms, 45 poles to the mile, with from 3 to 5 circuits of 10 copper and 12 iron all the way, using 125 of your 6 in. anchors with 8 and 10 ft. 5/8 galv. rods, all of them in up to the eye and never had a corner give.

"Point Pleasant Telephone Co.,
"H. H. Henry, General Manager."

MR. ALLEN L. HAASE, sales manager of the Harvard Electric Company, Chicago and New York, has just returned from a Southern trip.

Mr. Haase is much enthused about the prospects in all the cities he visited, including St. Louis, Louisville, Cincinnati, Indianapolis, Dayton, Columbus and Pittsburg. In his opinion there will be great difficulty relative to deliveries during 1909 for the reason that the manufacturers will be unable to satisfy the demand.

Since recovery from the August fire, which almost destroyed the Harvard plant, its factory has been working overtime. The total of the October orders taken was greater than any other two months during the 1908 season.

THE LEAD BELT TELEPHONE COMPANY, Flat River, Mo., has recently closed a contract with the North Electric Company, Kansas City, Mo., for a 400 line, common battery, lamp signal, transfer type and switchboard, and 400 common battery telephone sets. The Lead Belt Telephone Company will install several exchanges in its territory, and will have long distance connection with St. Louis, through the Kinloch Telephone Company.

THE NEBRASKA ELECTRIC COMPANY, of Omaha, Neb., has announced a change in management, as shown by the following new board of officers: Paul W. Horbach, president; Albert G. Munro, vice-president and treasurer; Carl W. Wilson, secretary. It is reported the policy of the company under the new management will be active and progressive, looking toward the continued improvement of its relations with a growing list of customers.

THE AMERICAN CONDUIT COMPANY, 140 Nassau street, New York, in Bulletin No. 252 describes the methods of joining its socket joint type of bituminized fiber conduit.

The nature of the process is clearly indicated by an illustration which shows the appearance of the joint after it has been wrapped with a strip of unbleached cotton, two or three inches wide, wound twice around the joint, after having been dipped into the sealing compound which is furnished with each order.

The following firms have issued elaborate new catalogues which are now ready for distribution: Monarch Electric & Wire Company, Chicago, Ill.; Hodge Electric & Manufacturing Company, Kansas City, Mo.; Rumsey & Sikemeier Company, St. Louis, Mo.; Central Electric Company, Chicago, Ill.; Zenco Electrical Supply Company, Chicago, Ill.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING CO., Rochester, N. Y., is distributing circulars describing its new key type intercommunicating system. Full information relating to the uses and operation of the system, which may be used as a local system only, or in connection with central office trunk lines, is given.

THE COMMERCIAL ELECTRICAL SUPPLY COMPANY, St. Louis, has issued its well known handy memorandum book for 1909. This, in addition to containing a dated writing space for each day of the year, includes tables of data useful for the electrician and exchange manager. The book is well arranged, and substantially and attractively bound.

A New Series of Moore Calendars.

The January calendar of Alfred F. Moore, of Philadelphia, is the first of a new series to be issued each month. The main part of the calendar is reproduced below and shows that the high artistic standard set by the series of

The January Moore Calendar.

last year will be maintained. In the cover sheet of the calendar attention is called to the fact that inquiries and orders for insulated wires, cords and cables will receive prompt attention, as a business organization of nearly ninety years standing is at the disposal of the inquirer.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

PERSONAL.

MR. R. E. BURKITT, of Woodstock, Ill., has been appointed manager of the Hebron, Ill., telephone exchange.

MR. R. T. HELM, of Belvue, Kan., has been appointed manager of the Westmoreland, Kan., telephone system.

MR. W. D. CLARK, of Hillsdale, Mich., has been appointed manager for the Michigan Telephone Company in Saginaw.

MR. C. T. PETERS, of Stonington, Ill., has been appointed manager of the Windsor Telephone Company, of Windsor, Ill.

MR. H. J. HALEY, of Paris, Ky., has been appointed general manager of the Carlisle Home Telephone Company, of Carlisle, Ky.

MR. F. D. CLARK, of Harrisburg, Pa., has been appointed manager of the exchange of the Bell Telephone of Pennsylvania at Chambersburg.

MR. RALPH W. WHITE, of Plattsmouth, Neb., has been appointed manager of the Nebraska City exchange of the Nebraska Telephone Company.

MR. H. W. KENT, formerly superintendent of the British Columbia Telephone Company, is now agent for the Northern Electric Company in British Columbia.

NEW COMPANIES.

RASPBERRY, ARK.—The Raspberry Telephone Company was recently organized with John W. Hensley, president; John Willis, secretary, and Bart Rudden, treasurer. The company proposes to build a line from Raspberry to Solo.

TURLOCK, CAL.—The Turlock Home Telephone and Telegraph Company has been organized at this place to conduct the local telephone exchange. The officers are: president, John L. Randolph; vice-president, J. C. Williams; secretary, A. J. Eddy; treasurer, T. H. Adams; manager, W. T. Thornburg.

DOVER, DEL.—The Eastern States Telephone and Telegraph Company has been incorporated with a capital of $500,000. The incorporators are Richard J. Morgan and Robert Voss Marye of New York, N. Y., and William S. James of Brooklyn, N. Y.

HAHIRA, GA.—The Hahira Telephone Company has been organized in this place with L. M. Stanfill as president and R. Y. Scruggs, secretary.

McLEANSBORO, ILL.—The McLeansboro Telephone Company has been chartered with a capital stock of $2,500 by M. M. Stephensen, J. R. Cross and others.

ELNORA, IND.—The Elnora Co-Operative Telephone Company, which has filed articles of incorporation with the Secretary of State, is capitalized at $2,200. The corporation proposes to establish an exchange and telephone lines in Elnora and operate and maintain toll lines connecting other towns in the counties of Daviess, Knox and Greene. Thos. M. Sears, J. E. Pershing, Harry Hitchcock, J. W. Pruitt are directors.

LADORA, IA.—Articles of incorporation have been filed for the Farmers' Mutual Telephone Company of this place. The capital stock is placed at $10,000. The officers and directors are: W. L. Morse, president; Fred Geuhorn, vice-president; M. W. Kelting, secretary; H. C. Gates, treasurer. Directors: E. H. Matteson, J. W. Bean and George W. Rumple.

LEONARDVILLE, KAN.—The Riley County Telephone Company of this place has been granted a charter. The capital stock is placed at $10,000.

SCIENCE HILL, KY.—The Science Hill Telephone and Exchange Company has been incorporated with a capital of $800. The incorporators are: William Lowery, T. W. Denney, A. Y. Hays and others.

STILLWATER, MINN.—The farmers south of Stillwater Junction have organized a new telephone company. The following officers have been chosen: Edmund Wolff, president; R. O. Ulrick, secretary-treasurer; H. Fenner, A. Robert and Frank Schwartz, directors.

CENTERVILLE, MO.—The Centerville Telephone Company has just been organized with the following officers: president, Glen D. Mains; secretary-treasurer, Frederick Dunlap. Directors: J. L. Williams, Halbert Myers, Joseph Cockley, William Woods, Frederick Dunlap and Glen Mains. The company is building a telephone line from Newville to Centerville and connecting with the towns of Dickinson, Cummingstown, Huntsdale, Mooredale and Longsdorf Station.

JEFFERSON CITY, MO.—The Farmers' Union Telephone Company of Neosho, has been incorporated with a capital stock of $1,750. The incorporators are: A. L. McConnell, J. B. Graves, George Hoover, William T. Matthews and others.

HELENA, MONT.—Articles of incorporation were recently filed for the Marysville Rural Telephone Company. The new line will extend from Marysville to Canyon Creek and Silver or Johns.

MILES CITY, MONT.—The Montana, Wyoming & Southern Railway Company, which was recently incorporated with a capital stock of $5,000,000, is also authorized to engage in the telephone and telegraph business, with this city and Sheridan as headquarters.

LINCOLN, NEB.—The Spring Branch Telephone Company, with a capital stock of $5,000, has filed articles of incorporation with the secretary of state. W. S. Roberts is president and the headquarters will be at Disney, in Holt county.

ALBANY, N. Y.—The American Telephone Company of Buffalo, with a capital of $300,000 has been incorporated. The directors are Herman R. Pease, Luther Hatch, John J. Tisdale, Barnet W. Harris, Reginald F. Penton, John G. Herb, Oliver O. Butcher, all of Buffalo.

ALBANY, N. Y.—The Berne Home Telephone Company of East Berne, Albany county, has been incorporated with a capital of $10,000. The company will operate from East Berne to Berne, to Thompson's Lake, to Altamont, to Voorheesville, to Slingerlands, to Albany. The officers have entered into an agreement with the management of the Home Telephone Company of Albany to use the lines of the Albany company for long distance messages. The directors of the new company are: Henry Bins, Luther D. Hungerford, Nathaniel D. Gallup, Winefred S. Dyer, of East Berne; George Palamatier, of Thompson's Lake, and Wallace E. Dietz, and Watson T. Chesbro, of Berne.

NEW YORK, N. Y.—The Hillsdale Telephone Company of Hillsdale, N. Y., has been incorporated with a capital stock of $5,000. The incorporators are: Frank R. Gilbert, Edward T. Logan, and Jacob Pfeiffer, all of Hillsdale.

RALEIGH, N. C.—The Co-Operative Telephone Company of Carthage has been granted a charter to erect and maintain a telephone system. The authorized capital stock is $25,000, with $5,200 paid in. J. F. Cole, G. McLeod and C. F. Leavitt are the incorporators.

HOOKER, OKLA.—The Farmers' Telephone Company has been recently organized with a capital stock of $2,000. The officers are: W. M. Atkins, president; Wm. Dixon, vice-president, and Robert Harville, treasurer.

PORTLAND, ORE.—The Interstate Telephone Company, with its principal office at Pendleton, has been incorporated with a capital stock of $50,000. The incorporators are M. H. Kirkham, M. J. Ready and T. E. McGinitie.

BIG SPRING, PA.—The Big Spring Telephone Company has been organized with the following officers: president, O. C. Tritt; vice-president, Ed. Dunlap; secretary-treasurer, O. J. Myers. Directors: A. S. Montgomery, Chas. Brandt, Robert Koons, A. G. Myers, A. J. Myers, C. C. Myers, Isaac Vanasdale, and G. A. Rea.

CHAMBERSBURG, PA.—In Guilford township, the farmers of the Falling Spring district recently organized a telephone company. The organization will be known as the Falling Spring Telephone Company and will operate a line between Stoufferstown and the head of the Falling Spring. The officers are: President, David Metz; vice-president, John S. Wiles; secretary, Jacob S. Stoner. It is likely that the company will connect with the American Union exchange in this place.

NASHVILLE, TENN.—The Gleason Rural Telephone Company, of Gleason, Weakley county, has been incorporated with a capital stock of $1,000. The incorporators are: J. E. Goldsby, A. W. Brawner, L. W. Carter, W. H. Williams, J. B. Gatewood, Will Horn and G. Courtwright.

NEW KENT, VA.—The New Kent Telephone and Telegraph Company has been incorporated with $5,000 capital stock. The officers are: C. L. Harrison, president; R. E. Richardson, vice-president, both of Talleysville, Va.; T. N. Harris, secretary-treasurer, New Kent.

SEATTLE, WASH.—The Skamania Co-Operative Telephone Association of Stevenson has been incorporated with a capital stock of $10,000. The incorporators are A. Fleischauer, P. C. S. Wills and R. C. Sly.

WILSON CREEK WASH.—A new telephone line from Wilson Creek to Stratford, by way of Wilbur flats, is being projected. Thomas Pearce, of Stratford, is president of the new company.

CHARLESTON, W. VA.—By the chartering of the Arborvale Mutual Telephone Company, with principal office at Arborvale, Pocahontas county a new and important telephone system is to be established in the southern section of the state. The authorized capital stock is $2,000 with $1,050 paid in. The incorporators are: S. B. Hammond, of Arborvale, and E. A. Hudson, F. H.

Warwick, L. H. Moomaw, J. H. Judson and John R. Hevener of Green Bank.

WHEELING, W. VA.—The Paradise and Raymond City Telephone Company, Putnam county, has been chartered to construct and maintain telephone lines. The capital stock is placed at $20,000.

DUBLIN, ONT., CAN.—The McKillop, Logan and Hibbert Telephone Company has been incorporated here with a capital stock of $15,000. The provisional directors are: A. V. H. Mitchell, Dublin, Ont., W. W. Sadler and J. Norris, Hibbert township.

FINANCIAL.

SANDWICH, ILL.—The directors of the Northern Illinois Telephone Company at their recent meeting declared the usual semi-annual dividend of 3½ per cent, payable Jan. 1, 1909.

LANSING, MICH.—The Grand Ledge Telephone Company has increased its capital stock from $25,000 to $50,000, according to articles filed with the secretary of state.

CHILLICOTHE, MO.—The board of directors of the People's Telephone Company has called a meeting for January 13 for the purpose of increasing the capital stock and to issue bonds to meet cost of enlarging and improving the plant.

MIDDLETOWN, N. Y.—The Orange County Telephone Company, of Middletown, has voted to increase its capital stock from $10,000 to $50,000.

BRISTOL, WIS.—The Bristol Telephone Company, at the annual meeting of the stockholders, decided to increase the capital stock of the company $3,000 to $8,000.

MADISON, WIS.—The Northfield Farmers' Telephone Company of Northfield has filed an amendment increasing its capital from $7,000 to $14,000.

RUSSELL, MAN., CAN.—The capital of the Russell Telephone Company has been increased from $5,000 to $25,000, the proceeds to be used for the construction of a number of extensions.

FRANCHISES.

GALVESTON, ILL.—The Kokomo Telephone Company has filed a petition with the town board asking that the company be granted a franchise to establish a service in Galveston.

MT. STERLING, KY.—A telephone franchise which is to run 20 years has been purchased by the Old Kentucky Telephone Company, which is now operating in this city.

SWANVILLE, MINN.—The Elmdale Rural Telephone Company has been granted a franchise in Swanville.

COLUMBIA, MO.—J. W. Grain and others have applied to the city council for a franchise to construct telephone lines in connection with the erection of rural telephone lines between Columbia and other points south.

GEARY, OKLA.—Capitalists are asking city of Geary for a telephone franchise and it is probable that the city council will grant it.

PHILADELPHIA, PA.—The Kutztown Rural Telephone Company has secured a right of way to extend its lines from Grimsville to Weisenburg.

HURON, S. D.—A petition has been presented to the city council for a telephone franchise to be granted to F. H. Kent, C. F. Koepp, William Waibel, S. P. Malone, J. R. Hinman, J. W. Campbell and C. E. Bryant Within a period of five years from the date of the franchise, the city has the right to purchase, under certain conditions, the entire plant.

HALIFAX, N. S., CAN.—The Wentworth Home Telephone Company has been granted a franchise to erect about 35 miles of telephone lines in Wentworth county.

CONSTRUCTION.

ROE, ARK.—A rural telephone company has been organized to the northwest of this place and construction work is now in progress.

RED BLUFF (TEHAMA CO.), CAL.—Government Telephone Engineers T. L. Day and Albert L. Case have gone to Paynes Creek to make a survey for a telephone line to be constructed to the Forest Reserve Station at Battle Creek Meadows. Forest Supervisor Kling, of the Mount Lassen Reserve, has stated that a government line will be built from Red Bluff to that place and that it is expected to have the line constructed in time for using in next summer's work. A limited number of the settlers will be allowed to attach to this line and be permitted to use it when not being used for government purposes.

LEWISTOWN, IDAHO.—Work is to begin soon on an exchange building for the Interstate Telephone Company which is rapidly building toward Lewistown from Spokane. The company is building a copper metallic circuit with trunk lines between large cities and making no connections with rural lines.

BLOOMINGTON, ILL.—During the coming year the McLean County Telephone Company contemplates completing the work of rebuilding its system of toll lines. This will involve an expenditure of about $20,000.

FULTON, ILL.—The Tri-City Telephone Company has installed a new switchboard in its local exchange.

LACON, ILL.—The Pekin Telephone Company is overhauling its system in this place.

FERDINAND, IND.—The Home Telephone Company has installed a new switchboard of greater capacity than the old one in the local exchange.

WARSAW, IND.—The Commercial Telephone Company is making plans for the construction of a new circuit six miles in length, due east from the exchange.

HUDSON, IA.—The Hudson Mutual Telephone Company is rebuilding its system in this city.

PARNELL, IA.—The Yankee Point Mutual Telephone Company has connected the Parnell switchboard with the North English board, by a commercial wire.

RED OAK, IA.—The Red Oak Mutual Telephone Company has recently installed a new switchboard in its exchange at this place.

SIOUX CITY, IA.—According to plans discussed at a recent meeting of the directors of the Sioux City Automatic Telephone Company, $75,000 will be expended during the coming year in improving and in increasing the capacity of the plant. Five branch exchanges are to be established, including Morningside, in which exchange a new switchboard is to be installed. These improvements will increase the system from 4,500 telephones to 6,500. Fifteen miles of new cable will have to be strung, ranging from 25 pairs of wires to 400 pairs.

WILLIAMSBURG, IA.—The Williamsburg Telephone Company is making some extensive repairs to its lines.

CARBONDALE, KAN.—The Carbondale Telephone Company is rebuilding its commercial line.

COOLIDGE, KAN.—The Holly Telephone Company is planning to make many improvements to its system in this place.

ELDORADO, KAN.—The Butler County Telephone Company is installing a new switchboard in its new building.

JEWELL CITY, KAN.—The poles and copper wire and all other material are here for the Jewell County Telephone Company's new copper connection. The poles are now being set from the Mitchell county line to Jewell City. At that point connection will be made with the Union Telephone Company, which covers all eastern Kansas with copper circuits, and this will furnish a direct line to Topeka, Leavenworth, Atchison, Kansas City, etc. From this place the copper line will be run to Mankato and later to the west line of the county.

LA CYGNE, KAN.—Manager Dowlen, of the La Cygne Telephone Company, is putting in about two thousand feet of cable and removing the wires and poles from Main street to the alley.

WICHITA, KAN.—Many improvements to the system of the Independent Telephone Company are contemplated, among them being an addition to the switchboard. Work is soon to be begun on a line from Wichita to Newton, which will give connection with Kansas City through Abilene.

ELIZABETHTOWN, KY.—The Hardin County and the Grayson County Telephone Companies have completed a metallic line between Elizabethtown and Leitchfield, a distance of thirty-three miles. Each company built one-half the line, the dividing line being one mile west of East View.

LEXINGTON, KY.—The Fayette Home Telephone Company has just purchased the old Baptist church building at the corner of Upper and Church streets. The building will be remodeled and improved. When the rebuilding is completed a new switchboard will be installed.

SERGENT, KY.—The Letcher County Home Telephone Company is repairing and overhauling its lines in this place. It announces that a system will shortly be built at Wright, Ky., connecting with the main line to Whitesburg. W. B. Webb, of this place, is manager of the company.

CRISFIELD, MD.—The Islands Telephone Company recently organized at Tangier Island, will build a cable line from Tangier and Smith's Islands to Crisfield.

LUDINGTON, MICH.—The United Home Telephone Company is building a number of new rural lines. Five miles of farmers' lines have just been completed in the vicinity of Round Lake.

NORTH HOPE, MICH.—The Billings Telephone Company is rapidly pushing the new lines through to Hope.

CHISHOLM, MINN.—The Mesaba Telephone Company has moved its exchange to larger quarters and installed a new switchboard.

UNDERWOOD, MINN.—There is agitation for the construction of a telephone line between Underwood and Phelps. The project will probably be successful.

CLIFTON, MO.—A toll line is being built from Clifton to Downing connecting the lines of the Clifton Telephone Company at Clifton with those of the Downing Telephone Company at Downing.

HITT, MO.—A new telephone switchboard will be installed in the local exchange in the near future.

SEDALIA, MO.—The Home Telephone Company has begun the installation of its new telephone system.

VANDALIA, MO.—A number of telephone lines running southward from Vandalia are being rebuilt.

NEWMAN GROVE, NEB.—Arrangements are under way by the Monroe Independent Telephone Company to connect by metallic wire with the long distance lines from Omaha and Sioux City.

STUART, NEB.—The Interstate Telephone Company has purchased from seventy-five to eighty miles of copper wire and is planning to rebuild the toll lines west and northwest of Stuart.

CARLSBAD, N. M.—The Public Utilities Company, which owns

the local telephone exchange and also the long distance system from Artesia to Malaga, is erecting a concrete exchange 20x20 ft., and a new and larger switchboard will be installed to accommodate the increasing business. An exchange at Malaga is also under consideration.

SANTA FE, N. M.—The Santa Fe Electric Telephone Company has begun installing a cable system throughout the city. Manager I. Sparks announces that work will soon begin on the construction of toll lines to Espanola and Lamy.

MANCHESTER, N. Y.—The Red Jacket Telephone Company is extending its service to cover a larger territory. Five miles of new line will be built connecting Farmington with Manchester.

ORISKANY FALLS, N. Y.—The Madison Mutual Telephone Company has extended its wires from Oriskany Falls to the north, adding a number of new subscribers to its list.

CARTHAGE, N. C.—The Carthage Telephone Company is planning the construction of telephone lines to Bensalem, Big Oak, Eagle Springs and Biscoe.

DRAPER, N. D.—A farmers' telephone line will be constructed which will run about 14 miles to the north of Draper. The work will be begun as soon as possible.

HETTINGER, N. D.—The Dakota-Montana Telephone Company is completing the work on the line between this city and Marmarth, and will soon begin the construction work on the Haynes-Mott line.

CANTON, OHIO.—The Stark County Telephone Company is installing a new toll board. The new board has twice the capacity of the old board and is capable of additions until 100 toll lines are reached.

KOMALTY, OKLA.—Interest in the proposed telephone system at Komalty is growing rapidly and there is a good prospect of establishing a switchboard and some five or six rural lines in the near future.

TAHLEQUAH, OKLA.—A local telephone company, headed by Frank Lewis, has completed a line to Beggs and Gideon in the northern part of the county. This gives Tahlequah telephone communication with practically the entire county, and has already been of great benefit to the officers, as well as the business and professional men of the town.

MARSHFIELD, ORE.—The Coos Bay Home Telephone Company has just purchased new equipment to the amount of about $35,000. The toll lines to neighboring cities will be rebuilt and the local system will be practically new throughout.

SPOKANE, WASH.—A rural telephone line has been completed from Pomeroy, Wash., running four miles westward out of that town to the mouth of Tatman Gulch, eastward up the Gulch four miles, thence westward across the hills to the Bundy place, in the Tucannon valley. There a T is formed, the line running up and down the stream. The line is 15 miles in length.

BRISTOL, WIS.—The Bristol Telephone Company has decided to erect an exchange building and make several extensions to its lines.

BAGGS, WYO.—E. M. Tierney, who heads an organization of Rawlins capitalists, announces that a telephone line between Baggs and Wamsutter is to be constructed as soon as arrangements for the work can be made.

EDMONTON, ALB., CAN.—The city council is considering the installation of a telephone fire alarm system. Telephone Commissioner Cummings has the matter in charge.

FERNIE, B. C., CAN.—The East Kootenay Telephone Company is reconstructing its Fernie system.

CRANBROOK, B. C., CAN.—The Kootenay Telephones, Ltd., will build a telephone line along the proposed railway from McGillvray to Corbin, B. C., and will also construct lines through the country to the north of Spokane on the Canadian side of the boundary.

FERGUS, ONT., CAN.—The A. E. Nichols Telephone Company has completed a line from here through Speedside into Eramosa township. This is the first of several lines to be built from this town.

ELECTIONS.

BROWNSVILLE, IND.—At the annual meeting of the Brownsville Telephone Company the following officers were elected: President, George Ridge; vice-president, John L. Maker; secretary and treasurer, Cynthia A. Brown.

LARRABEE, IOWA.—The following officers and directors were elected at the recent annual meeting of the Northwest Cedar Mutual Telephone Company: President, W. R. Montgomery; vice-president, R. H. Gray; secretary, F. M. Arrasmith; treasurer, Henry Montgomery. Directors: Wm. Ogle, G. Sunbladt, August Anderson and W. R. Montgomery.

LESTER, MICH.—The following directors have been elected by the Lester Telephone Company: George Paradine, John Quimby, Emery Warren, Everard Hawes and George McNitt.

PRAIRIE HOME, MO.—The Prairie Home Telephone Company has elected the following officers: W. C. D. Carlos, president; H. Fricke, vice-president, and L. B. Laws, treasurer.

PAVILLION, N. Y.—The following officers and directors have been elected by the Pavillion Telephone Company: H. S. Bradley, president; Earl Starr, vice-president; D. C. Higgins, treasurer. Directors: H. S. Bradley, C. E. Hamilton, E. D. Starr, D. C. Higgins, S. O. Hubbard, M. A. Christman and Dean Hudson.

SPENCERPORT, N. Y.—The following directors have been elected by the stockholders of the Ogden Telephone Company: Frank Blackford, Edward Roach, Arthur Nichols, Chas. Gallup, B. J. Collins, H. D. Burritt and Louis Adams.

UHRICHSVILLE, OHIO.—The Plum Run Valley Telephone Company has elected the following officers to serve two years: President, E. A. Philips; vice-president, I. Miller; treasurer, J. Q. Law; secretary and general manager, W. H. Birney.

PITTSTON, PA.—The following officers have been elected by the Commonwealth Telephone Company: President, J. H. Foy; vice-president, John Thorburn; treasurer, M. L. Perrin; secretary and general manager, W. D. Gay.

DE SOTO, WIS.—At a meeting of the stockholders of the Ferryville Telephone Company, the following officers were elected: Martin Rutter, president; J. C. Newton, secretary; Aleck Bean, treasurer. Directors: Delmer Morton and J. C. Gorton.

FOND DU LAC, WIS.—At a recent meeting of the stockholders of the Eldorado & Friendship Telephone Company, officers were elected as follows: President, W. C. Ray, Empire; vice-president, John W. Dowd; secretary and treasurer, L. G. Barnes, Fond du Lac. Directors: John Reilly, W. H. Keys, W. T. Reilly, W. C. Ray, Empire; John M. Dowd and L. G. Barnes.

MISCELLANEOUS.

COLOMA, CAL.—A committee of Coloma citizens consisting of A. W. Norris, E. Thole, John McKay and J. P. Dunkum, are soliciting assistance to aid in the purchase and maintenance of the telephone line between the county seat and Lotus via Coloma. They have been quite successful in securing contributions, and the line will in all probability be maintained.

NICKERSON, KAN.—The Nickerson Telephone Company has bought a site and will erect an office building in the near future.

SCRANTON, KAN.—The local telephone system has been purchased by Henry Isaacs.

PARK RAPIDS, MINN.—A special election will be held to vote upon the question of authorizing bonds, the proceeds of which will be used in the construction of a municipal telephone exchange.

MEADVILLE, MO.—The Meadville telephone exchange, owned by H. M. Patterson, has been sold to Barnes & Pratt, of Bucklin and Brookfield, for the sum of $4,000.

STOUTSVILLE, MO.—The Independent telephone exchange, owned by S. T. Pollard, has been sold to W. M. McCoy, of Chicago, for $4,200. Mr. McCoy intends to make many improvements in the near future.

POWELL, NEB.—The Powell Telephone Company has been sold to the Fairbury Telephone Company.

ALBANY, N. Y.—Representatives of the Home Telephone Company and of the Commercial Telephone Company, of Troy, are conducting negotiations with representatives of the recently organized Rensselaer Telephone Company, with a view to establishing an Independent telephone company in Rensselaer. It is proposed to put canvassers into the field at once and as soon as 400 subscribers shall have been secured construction work will be begun. The promoters claim a right to operate the line under a franchise granted in 1902 by the common council.

CYRIL, OKLA.—W. A. Wright has purchased the stock of the Cyril Telephone Company and has taken charge.

GUTHRIE, OKLA.—George Player, telephone expert for the Oklahoma Corporation Commission, is engaged in making extensive preparations for appraising the telephone companies operating in the state. His report will be a valuable document for the Commission, as it will include the cost of maintenance, operating expenses and the earnings of the companies, and will be of material benefit to the Commission in determining the many rate questions now under consideration.

RYAN, OKLA.—The city will vote on a bond issue for installing a telephone system.

BRIGHAM, UTAH.—At the recent session of the city council, Mayor Blackburn introduced a resolution to the effect that Brigham City install a municipal telephone system, to be owned and controlled by the city. It is proposed to bond the city and install a plant at a cost of about $12,000. Five hundred telephones would be installed in the beginning and a rate of about $1 per month charged for each telephone. It is figured that the system would pay for itself in about three years. A committee was appointed to investigate the matter.

SPOKANE, WASH.—William Mead, representing California capitalists, who own the controlling interest in the Home Telephone Company of Spokane, announced recently that traffic arrangements of mutual advantage, will be made with the Inter-State Telephone Company, leaving the long distance field east of the Cascade mountains in the hands of the last named concern. He added that ultimately the Home company will build a long distance line from the Pacific Coast to Spokane.

RAPID CITY, MAN., CAN.—The rural municipalities of Saskatchewan will vote on the question of municipal telephones and if the ratepayers are in favor of the project, a system will be built as early as possible in the spring. Connections will be made with the long distance system of the Manitoba Telephone Commission at several points, as well as with the adjoining municipalities which now have municipal systems

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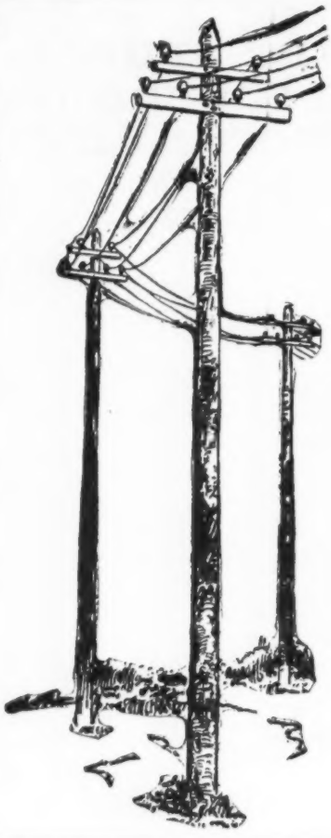

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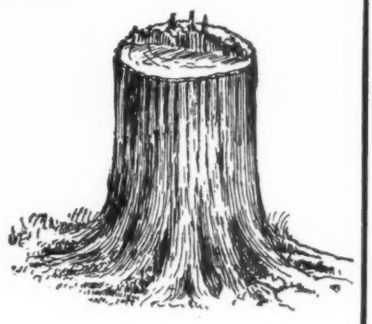

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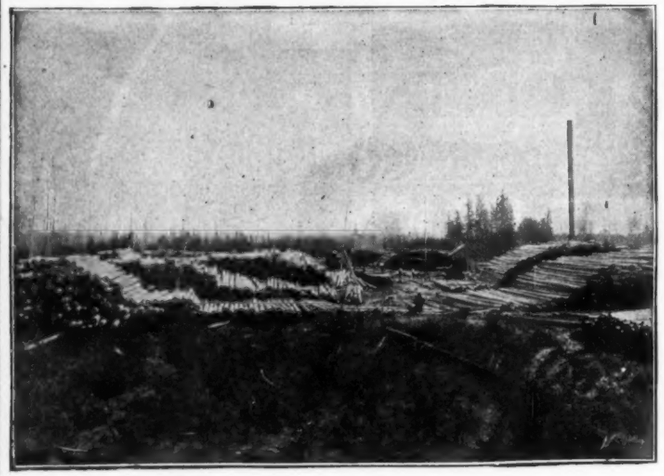

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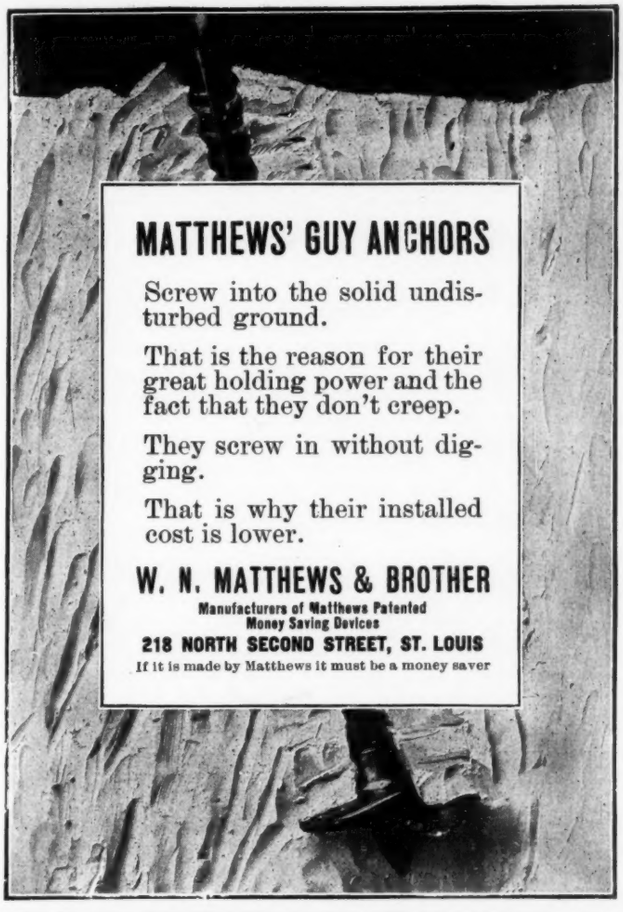

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Screw into the solid undisturbed ground.

That is the reason for their great holding power and the fact that they don't creep.

They screw in without digging.

That is why their installed cost is lower.

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Manufacturers of Matthews Patented Money Saving Devices
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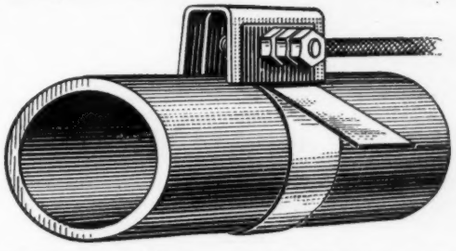

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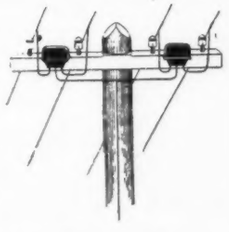
Well I guess YES.
Look at those places on the pole line that get touched up regularly. That is a good place for



Chapman Lightning Arresters

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POLES From stump to consumer. A full assortment of sizes.
KAYE & CARTER, Minneapolis, Minn.

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It won't break
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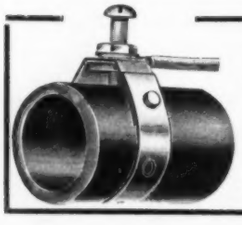
Telephone Exchange of over 300 pay phones in a town of 2000 people in Eastern Kansas; also several miles of good toll line in connection with it. Write for full particulars. Address No. 549 Telephony.



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Blackburn Ground Clamps

as in any previous year.

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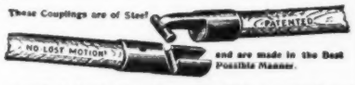

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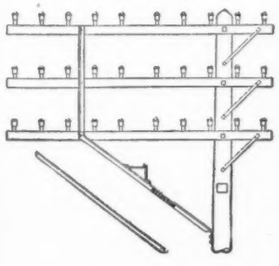

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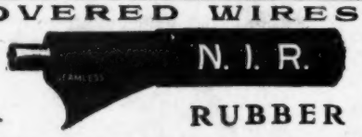

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